PARMAR
SSC

# SSC GK

# PARMAR'S GK BATCH

# Biology

# Cell

## Lecture :- 1

✓ For Notes Join Telegram :

Click on the icon.

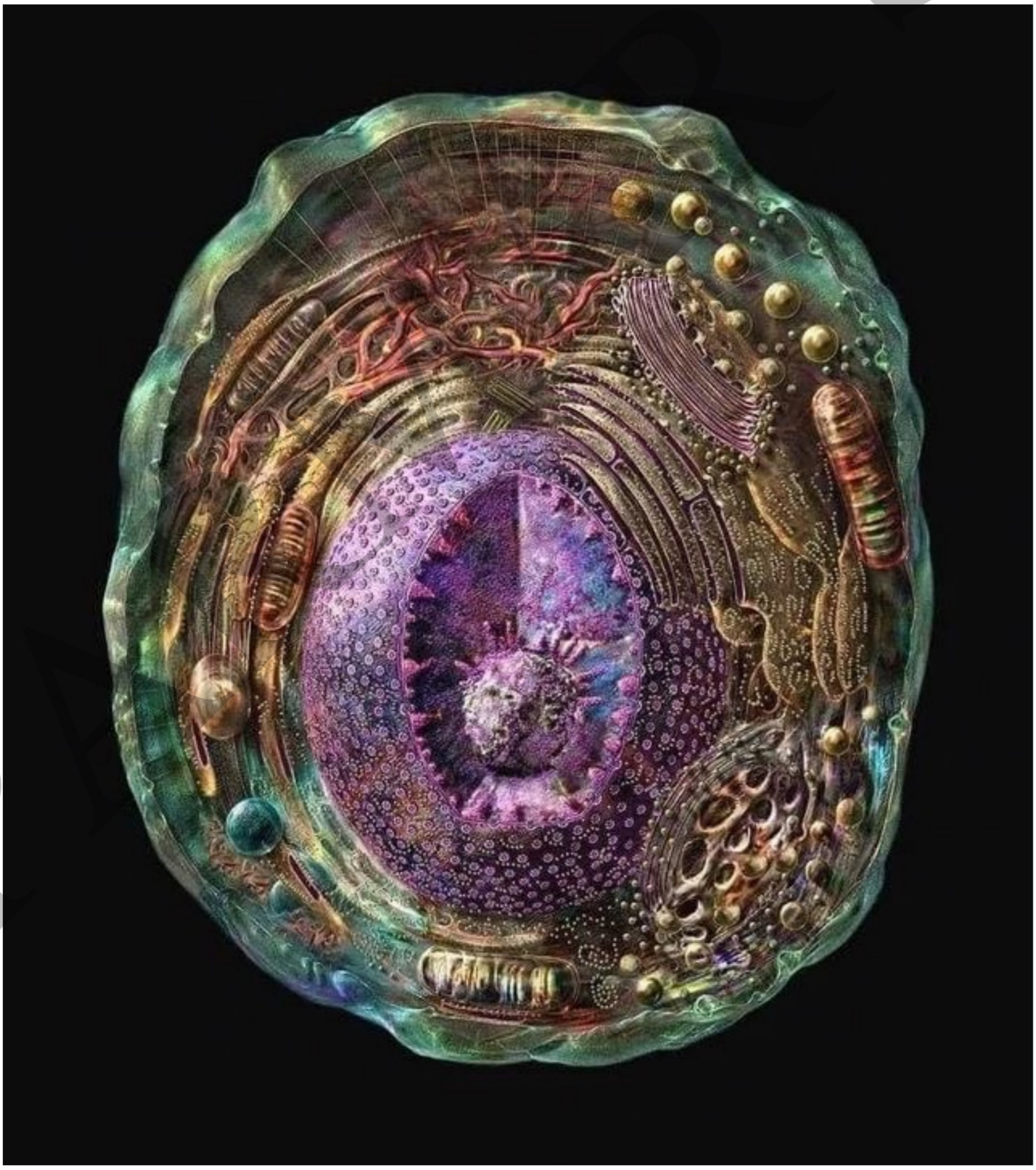
OR
Scan

✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

OR
Scan

# The Cell



## Cell Defination

- building blocks of life
- fundamental unit of life
- structural or functional basis of life

**Cell Study** → is called cytology

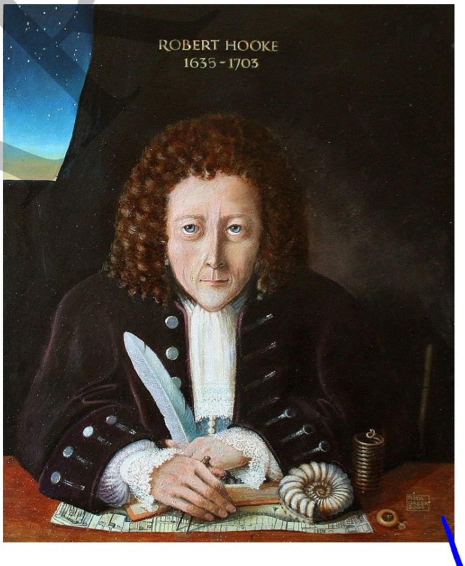
Cyto: Cell
Logy: Study

Cell
↓
Tissue
↓
Organs
↓
Organ system

## Cell Discovery

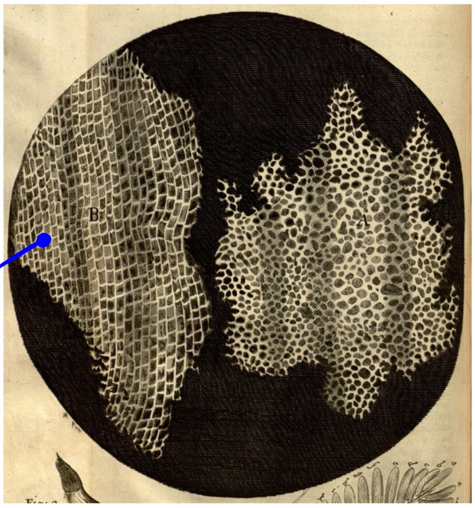
- First discovery by: Robert Hooke (1665)
- Observed in cork
- Cork is obtained from bark of tree

↓ Dead cell



→ Father of cytology

Cork Cell



Honeycomb shape
(with compartments)

## Some other discoveries

in pond water

↑

- Atomic van Leeuwenhoek (1674) — Free living cells in water (Father of modern cytology)
- Robert Brown (1831) — Nuclues
- Purkinje (1839) — named Protoplasm

## Cell Theory

- "All the plants and animals are composed of cells"
- "Basic unit of life"

↓

Given by: Schleiden and Schwan (1838)

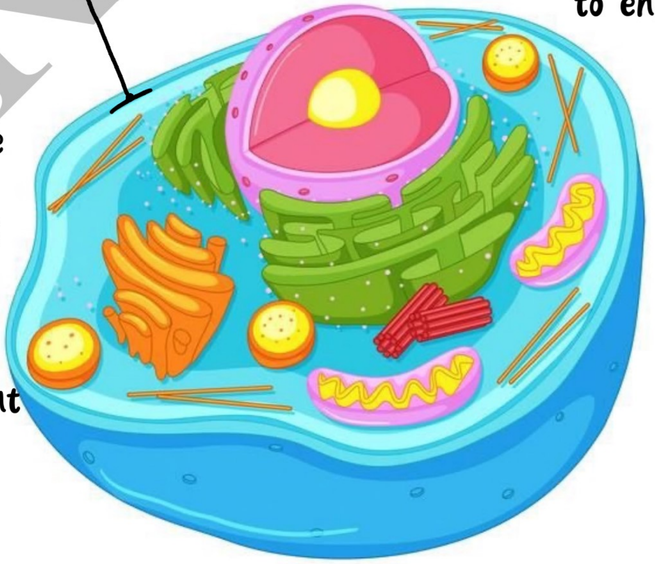
↓

Virchow further worked on it

## Parts of Cell

- **Cell membrane**

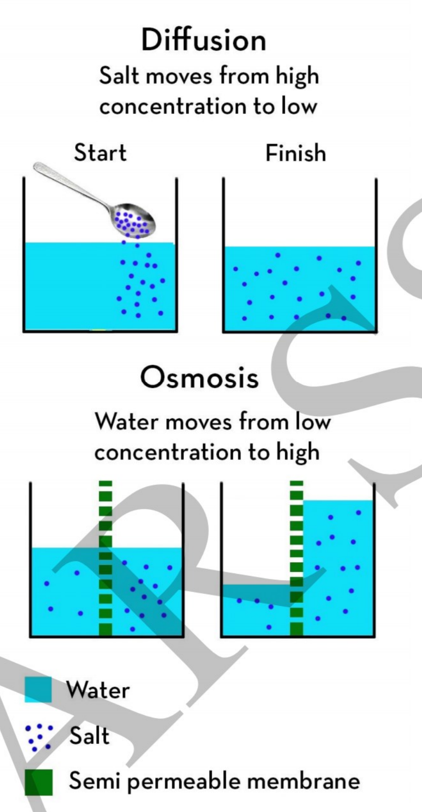
- Protects the cell: bodyguard
- Thin, elastic, flexible
- Living
- Outer most covering
- Provides definite shape and holds content of cell
- Present in both plant and animal



**Other characteristics:**

- Selectively permeable (only allows some materials)
- Proteins+lipids (composition)
- Flexibility enables the cell to engulf food

# Movements across Cell Nembrane


Diffusion
Salt moves from high concentration to low
Start
Finish
Osmosis
Water moves from low concentration to high
Water
Salt
Semi permeable membrane

- **Diffusion**

- Spontaneous movement of molecules from high to lower concentration

Rate of Diffusion mixing

Gases > liquids > solids

ex: Agarbatti smell diffusion, ions/molecules – $CO_2$ , $O_2$

- due to cellular activities, $CO_2$ production takes place

Conc. of $CO_2$ inside cell > Conc. of $CO_2$ in external environment

CO leaves cell through diffusion

humesha concentration of water hi Lena hai

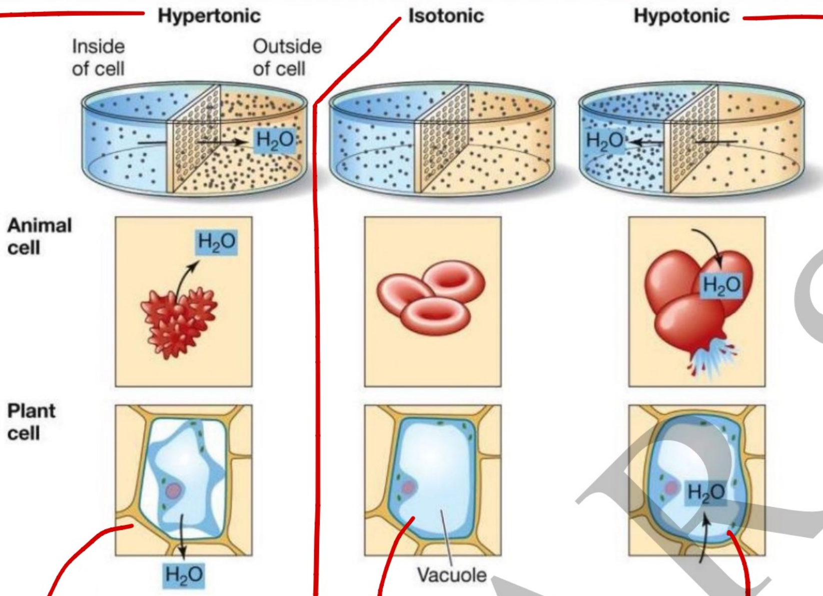
Osmosis: Movement from high to low but through a semipermeable membrane

Solution = Solute + Solute

| Hypertonic | Hypotonic | Isotonic |
|---|---|---|
| Solute > Solvent | Solute > Solvent | Solute = Solvent |

cell absorbs water through osmosis, no energy is required and lasts upto equilibrium state

## Summary: What happens to cells when placed in a solution which is :


Hypertonic
Isotonic
Hypotonic
Inside of cell
Outside of cell
$H_2O$
$H_2O$
Animal cell
$H_2O$
$H_2O$
Plant cell
$H_2O$
$H_2O$
Vacuole

Hypertonic → Concentrated solution

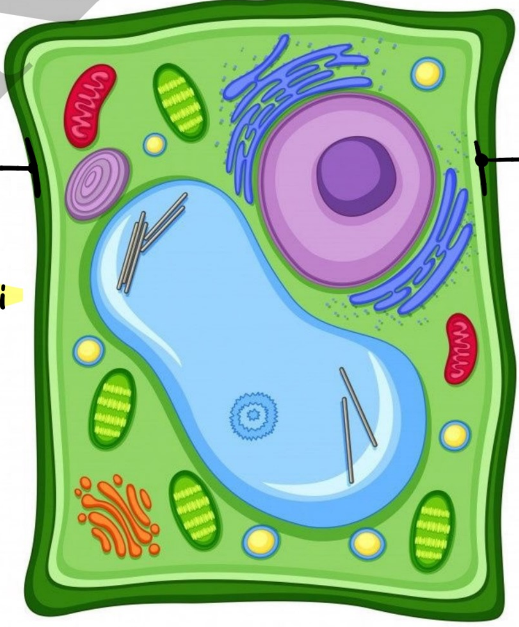
Isotonic → Normal solution

Hypotonic → Dilute solution

Shrunken cell

No change in cell

Swollen cell

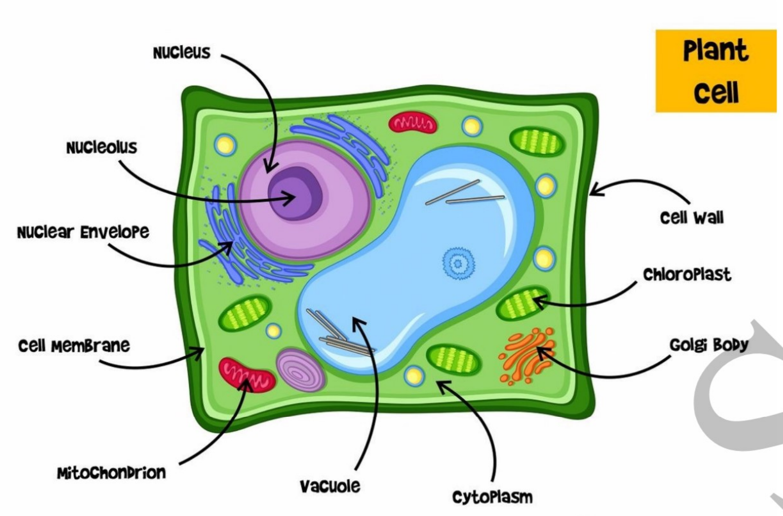


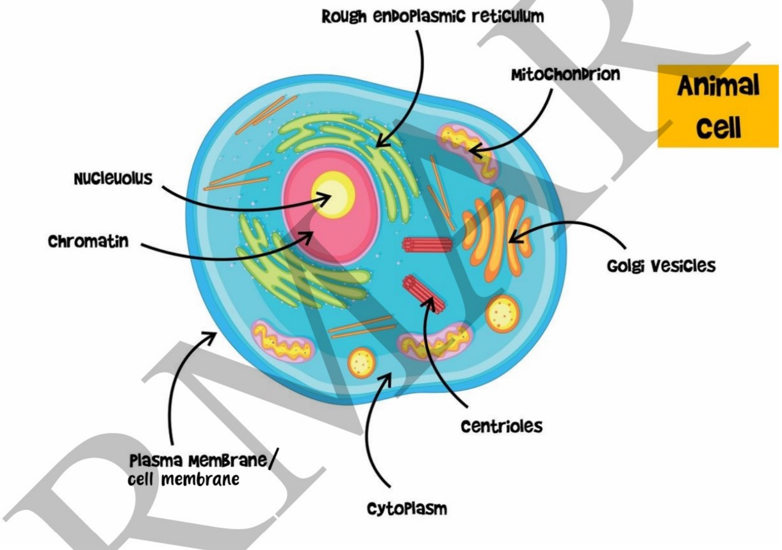
- Cell wall

- Only present in plants and bacteria and fungi
- Non-living
- Freely permeable
- Determines shape
- Made up of cellulose
- Provides strength and turgidity to cells

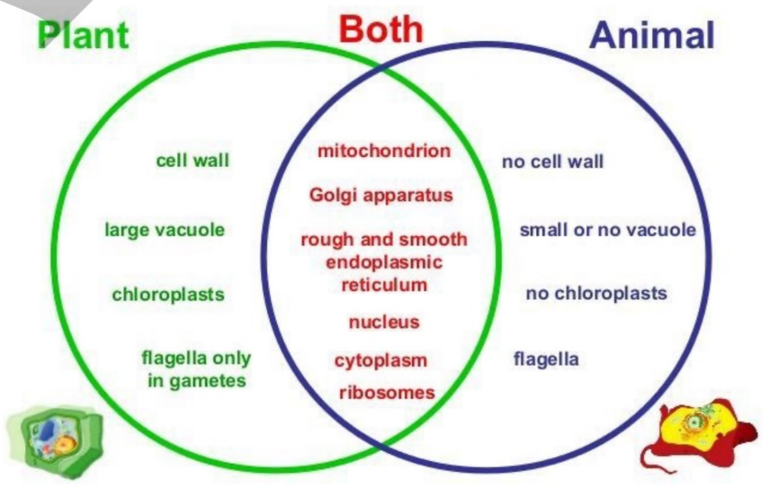
Cell membrane

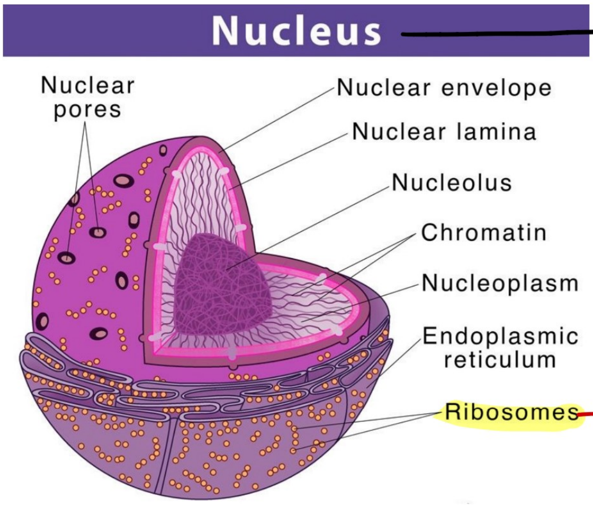
- bacteria cell wall made of: Glycocalyx
- Fungi: Chitin


Plant cell
Nucleus
Nucleolus
Nuclear Envelope
Cell Membrane
Mitochondrion
Vacuole
Cytoplasm
Golgi Body
Chloroplast
Cell Wall


Rough endoplasmic reticulum
Mitochondrion
Animal cell
Nucleuolus
Chromatin
Golgi Vesicles
Centrioles
Plasma Membrane/ cell membrane
Cytoplasm

## Compare and Contrast


Plant
Both
Animal
cell wall
large vacuole
chloroplasts
flagella only in gametes
mitochondrion
Golgi apparatus
rough and smooth endoplasmic reticulum
nucleus
cytoplasm
ribosomes
no cell wall
small or no vacuole
no chloroplasts
flagella


Nucleus
Nuclear pores
Nuclear envelope
Nuclear lamina
Nucleolus
Chromatin
Nucleoplasm
Endoplasmic reticulum
Ribosomes

- cellular component of cell
- Centrally located
- Large in size
- Largest cell structure

Ribosomes: involved in formation of proteins

Components of Nucleus

**Nuclear envelope**

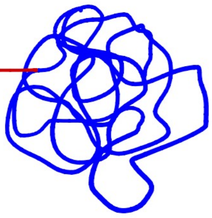
- Composed of membranes
- Covers Nucleus
- Separates nucleus from cytoplasm
- Permits materials between nucleoplasm and cytoplasm

**Nucleoplasm**

- Liquid ground substance of nuclear envelope

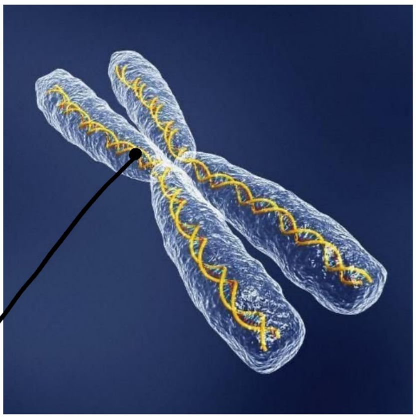
Types:
- Nucleolus
- Chromatin material

**Chromatin material**



- Entangled mass of thread like structures
- During cell division they get organised in chromosome

## Chromosomes



- Thread like structures
- Visible during cell division
- Components:
  - DNA
  - Proteins

chromosomes: 23 pairs

22 pairs (autosomal)

1 pair (sex pair)

- XY: Male
- XX: Female

Total: 46 chromosomes

## DNA

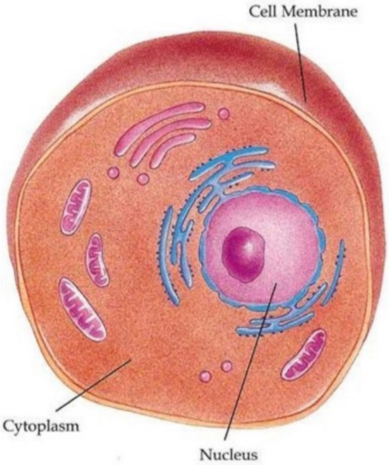
- Molecule discovery: Fredrick Mischer
- Double-helical structure: Watson and Crick (1953)

- Consists of genes
- Genetic information transferred from one generation to another

genes are functional segment of DNA

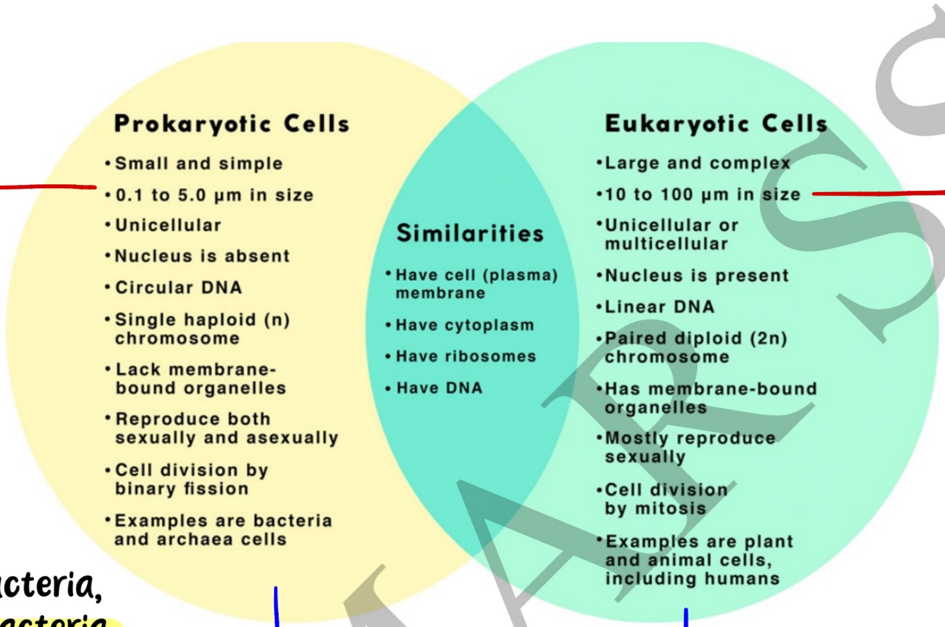
## Cytoplasm

- Parts between plasma membrane and nuclear envelope
- Cell organelles present in cytoplasm



Types of cell
- Prokaryotic cell
- Eukaryotic cell

or 1-10μ meter



**Prokaryotic Cells**
- Small and simple
- 0.1 to 5.0 μm in size
- Unicellular
- Nucleus is absent
- Circular DNA
- Single haploid (n) chromosome
- Lack membrane-bound organelles
- Reproduce both sexually and asexually
- Cell division by binary fission
- Examples are bacteria and archaea cells

**Similarities**
- Have cell (plasma) membrane
- Have cytoplasm
- Have ribosomes
- Have DNA

**Eukaryotic Cells**
- Large and complex
- 10 to 100 μm in size
- Unicellular or multicellular
- Nucleus is present
- Linear DNA
- Paired diploid (2n) chromosome
- Has membrane-bound organelles
- Mostly reproduce sexually
- Cell division by mitosis
- Examples are plant and animal cells, including humans

or 5-10μ meter

ex: bacteria, cynobacteria, mycoplasma

ex: Plant and Animal cells

Pro: before Karyotes: nucleus
Eu: true

Blue green algae

- Common in both: ribosomes

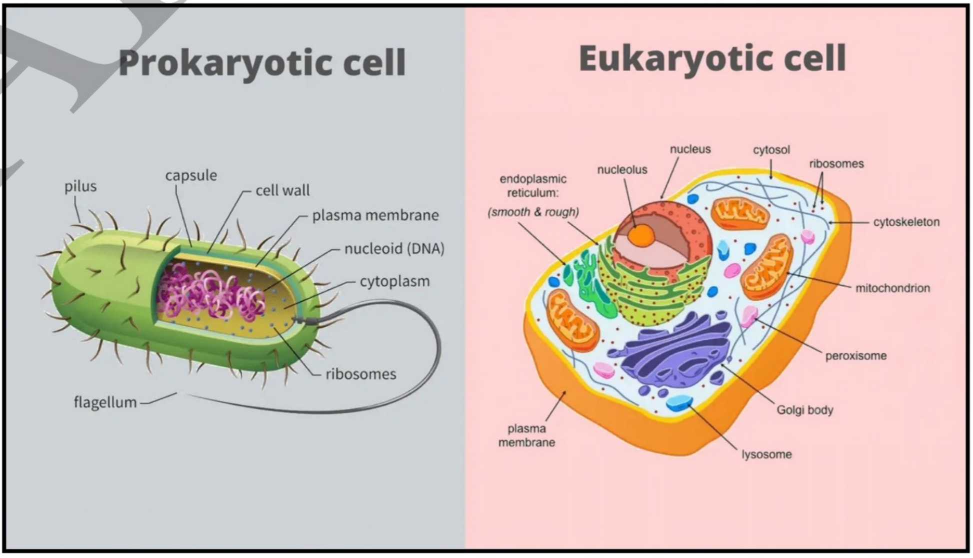
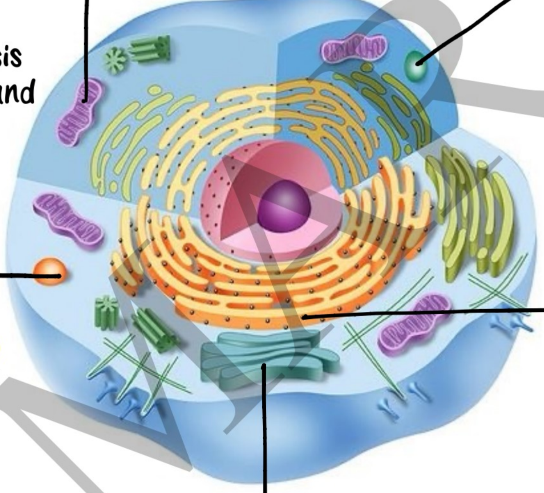

Prokaryotic cell
pilus
capsule
cell wall
plasma membrane
nucleoid (DNA)
cytoplasm
ribosomes
flagellum
Eukaryotic cell
nucleus
cytosol
nucleolus
ribosomes
endoplasmic reticulum:
(smooth & rough)
cytoskeleton
mitochondrion
peroxisome
Golgi body
lysosome
plasma membrane

**Figure:** Prokaryotic Cell and Eukaryotic Cell

# Cell organelles



## Mitochondria

- "powerhouse of the cell"
- ATP (Adenosine Triphosphate), makes energy
- Two-membranes:
  - Outer: Porous
  - Inner: ATP synthesis
- Has its own DNA and ribosomes

Energy currency of the cell

## Lysosomes

- "Suicidal bag of the cell"- waste disposal of cell
- Filled with digestive enzymes

## Vacuoles

- Membrane bound
- Solid or liquid filled
- Sac-like

in plants:

- Large, distinct
- Store cell sap
- Provide turgidity and rigidity
- 50-90% of volume

in animals:

Small, temporary and stores glucose, glycogen, protein

## Endoplasmic Reticulum

- Membrane bound organelle

Rough ER: makes proteins, ribosomes present

Smooth ER: synthesis of fats and lipids, ribosomes absent

Types

Long Tubules

Vesicles

Cisternae

- Attached to plasma membrane on one side and outer nuclear membrane on other

### Functions:

- Proteins: RER
- Fats and lipids: SER
- Proteins and lipids act as hormones and enzymes
- ER serves as transport bet$^n$ cytoplasm and nucleus

in RER

## Golgi bodies

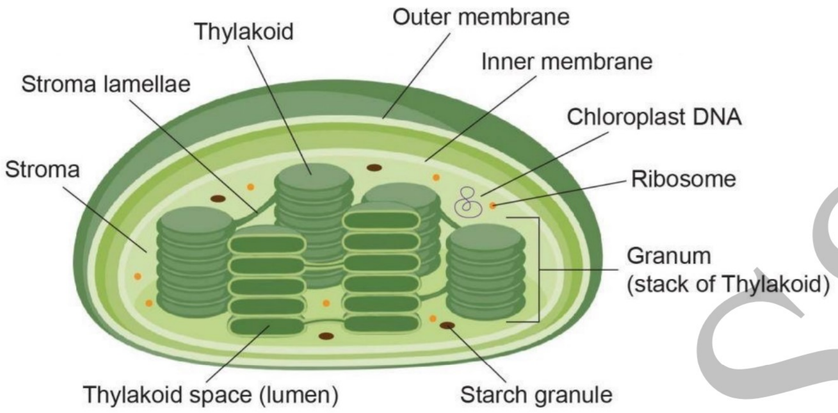
- Discovered by Camillo Golgi
- Consists of vesicles, cisternae, vacuoles

Cis face: towards nucleus

Trans face: towards plasma membrane

### Functions:

- Stores, modification of package
- Simple sugars from complex sugars
- Forms lysosomes


Thylakoid
Outer membrane
Inner membrane
Stroma lamellae
Chloroplast DNA
Stroma
Ribosome
Granum
(stack of Thylakoid)
Thylakoid space (lumen)
Starch granule

## Plastids

Only in plant cell, not in animal cell
Has its own DNA and Ribosomes

Types:

- **Chloroplasts:** contains chlorophyll pigment → contains Mg for food synthesis
  Also contain yellow and orange pigments
- **Chromoplasts:** contains different types of pigments which provides colour → imparts colour to flowers and fruits
- **Leucoplasts:** colourless or white in colour
  Stores starch, oil and protein granules

## Cell Division

Division of cells into new cells

Reason for division:

- growth of organism
- replace old, dead and injured cells
- for gamete formation

Types:

- Mitosis
- Meiosis

| Mitosis | Meiosis |
|---|---|
| It occurs in Somatic cells | It occurs in Germ cells |
| ✓ Nucleus divides only once | Nucleus divides twice |
| ~~It is divided into prophase, metaphase, anaphase and telophase~~ | ~~Meiosis I and II divided into prophase I and II, metaphase I and II, anaphase I and II and telophase I and II~~ |
| Daughter cells are diploid – 2 | Daughter cells are haploid – 1 |
| ✓ No crossing over takes place | Crossing over takes place |
| Increase number of normal cells | Produces egg and sperm cells |
| Involved in healing and growth | Involved in genetic variations |
| ✓ 2 daughter cells are produced | 4 daughter cells are produced |
| Malfunction results in cancer | Malfunction results in genetic disorder such as Down's syndrome, klinefelter's syndrome and Turner's syndrome. |

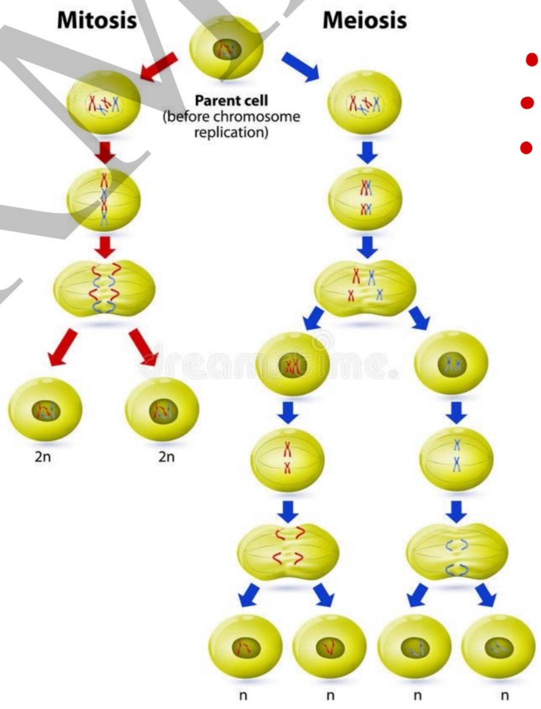
involved in reproduction

Largest cell in humans

Smallest cell in humans

*Learn only marked ones

Uncontrolled cell division

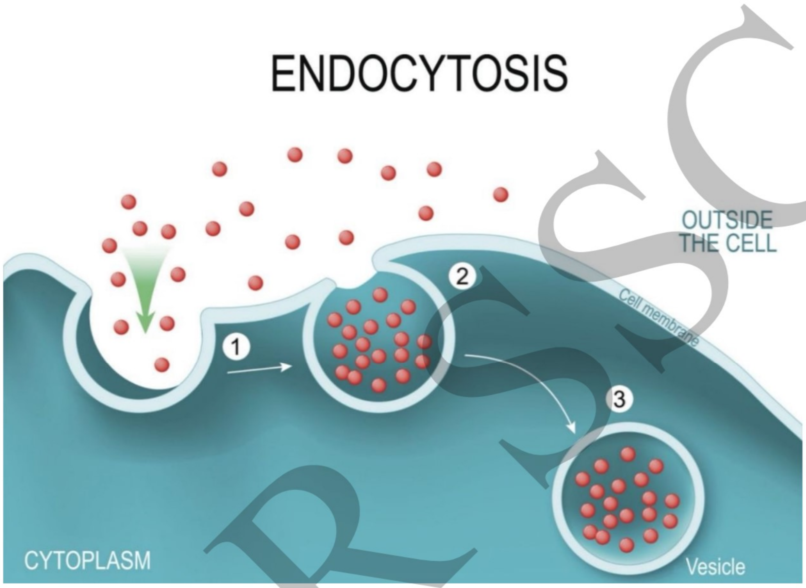


- largest cell: Ostrich egg
- smallest cell: Gallicepticum
- Longest cell in human: Neurons

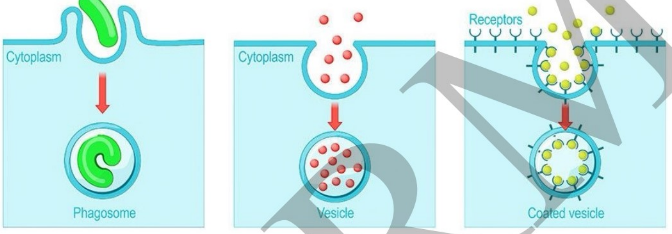
## Endocytosis

- Type of active transport
- Movement of particle into the cell from external environment

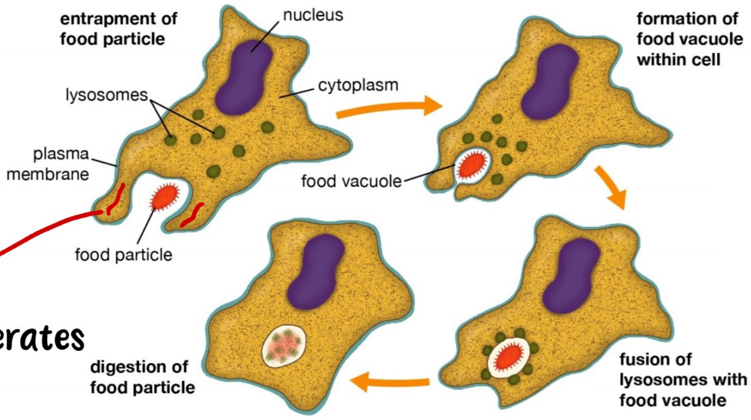
Endo: andar
Exo: bahar


ENDOCYTOSIS
OUTSIDE THE CELL
Cell membrane
1
2
3
CYTOPLASM
Vesicle

Endocytosis


Cytoplasm
Phagosome
Cytoplasm
Vesicle
Receptors
Coated vesicle

1. PHAGOCYTOSIS (cell eating)
2. PINOCYTOSIS (cell drinking)
3. RECEPTOR-MEDIATED endocytosis


entrapment of food particle
nucleus
lysosomes
cytoplasm
plasma membrane
food particle
formation of food vacuole within cell
food vacuole
fusion of lysosomes with food vacuole
digestion of food particle

False feet generates

Pseudopodia: false feet of amoeba

- Biological stains used in histology and cytology to colour cell nuclei red: Safranin

- Most abundant molecule in cell: Water (70% or more of total cell mass)

- Phases of Golgi apparatus:
  Concave: maturing face
  Convex

- Group of ribosomes attached to mRNA: Polysomes

- Mitochondria without outer membrane is called mitoplast

- Active transport example: Sodium and Potassium pumps

- Peptidoglycan: Bacteria
- Cellulose: Plants
- Chitin: Insects
- Pectin: Fruits

PARMAR SSC

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Tissues / ऊतक

### Lecture :- 2

✓ For Notes Join Telegram :

OR
Scan

Click on the icon.

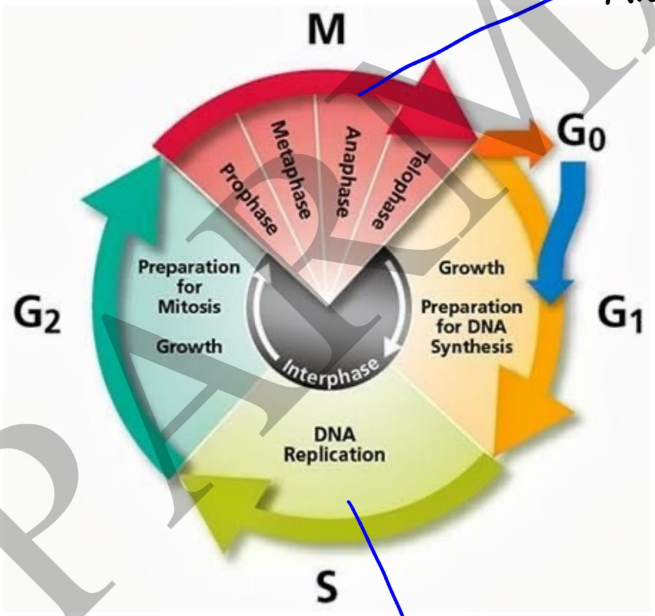
✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

OR
Scan

Click on the icon.

- Outermost layer found in cell envelope of bacteria: Glycocalyx
- Bacterial cell wall: Peptidoglycan
- Plasmid DNA function: to confer certain unique phenotypic characters to bacteria
- Role of ribosomes of a polysome is to translate mRNA into proteins
- Peroxisomes: oxidative crystals
- Cell that is aloe void in shape: White blood cell (has irregular shape)
- Transcription: the process of the flow of genetic information from DNA to RNA
- Nucleus was discovered by Robert Brown

## Cell Cycle


M
Prophase
Metaphase
Anaphase
Telophase
$G_0$
$G_2$
Preparation for Mitosis
Growth
Growth
Preparation for DNA Synthesis
$G_1$
Interphase
DNA Replication
S

Mitosis (cell division)

DNA synthesis

- Major microtubule-organizing centre (MTOC) in eukaryotic cells involved in various cellular process, including sensory reception, locomotion, and embryogenesis: Centrosome
- Cell theory that proved the quasi-fluid nature of lipids to enable lateral movement of proteins within the bilayer: Fluid Mosaic Model
- Protein that protects epithelial cells from damage: Keratin

## Tissues

- group of cells that have similar structure combined together to perform a specific function forms a tissue

Tissues

plant tissues

animal tissues

## Importance

- Causes division of labour in multicellular organisms
- Decreases workload on individual cells
- Leads to organisation

Basic Unit of Life → Cell

Group of cells → Tissue

Group of tissues → Organs

Group of organs → Organ System

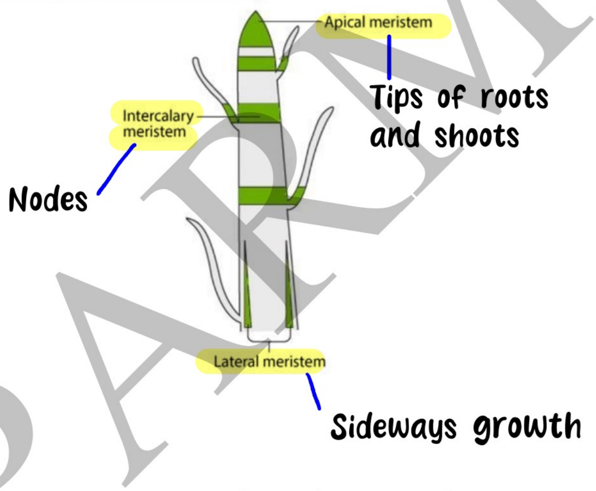
Group of Organs System → Organism

# Plant tissue

## Meristematic tissue

- occurrence: growing regions of plants (root, shoot, etc)
- shape: spherical, oval or rectangular
- Intercellular spaces: absent
- Vacuoles: absent
- Active cells
- Cytoplasm: dense
- Cell wall: cellulose
- Nuclei: prominent
- Cell division

MERISTEMATIC TISSUE


Apical meristem
Tips of roots and shoots
Intercalary meristem
Nodes
Lateral meristem
Sideways growth

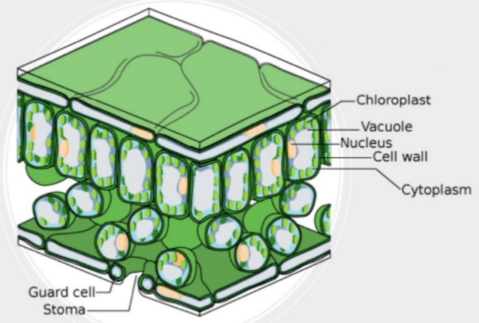
Height growth: Apical and intercalate
Width growth: Lateral

| Lateral | Intercalary | Apical |
|---|---|---|
| Present beneath the bark | Present at the base of leaves/internodes | Present at shoot and root apex |
| Increase girth of root or stem | Increase length of leaves and internodes | Increase in length of root and stem |

## Permanent tissue

- when cell lose the ability to divide, by the process of differentiation, the take a permanent shape, size and function
- Structure: large central vacuoles Cell wall in thin/thick
- Function:
  - protection
  - Support
  - Storage
  - Photosynthesis

PERMANENT TISSUE


Chloroplast
Vacuole
Nucleus
Cell wall
Cytoplasm
Guard cell
Stoma

### Types

- Simple
- Complex

## Types

mechanical tissue

## a) Collenchyma Tissue

**Occurrence**: in leaf stalks and stem of dicots

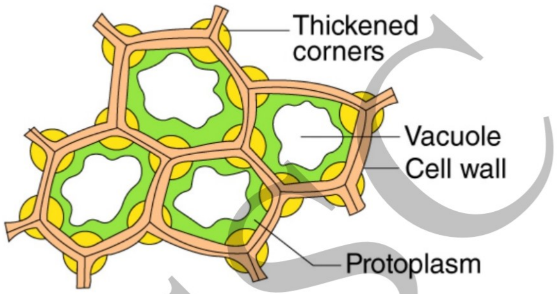
### Cell Structure

- Living
- Elongated
- Irregularly thickened at corners
- Very little intercellular space

### Functions

- Provides mechanical strength and flexibility
- Allows bending of parts

ex: tendrils and stems of climbers

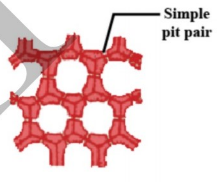

Thickened corners
Vacuole
Cell wall
Protoplasm

## b) Parenchyma Tissue

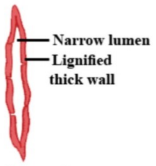
### Functions

- Food storage tissue
- In some cases contains chlorophyll, called Chlorenchyma
- When loosely packed, intercellular airy spaces are present called Aerenchyma

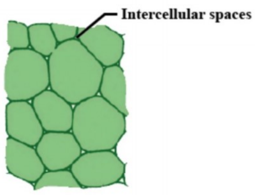
Provides buoyancy to parts, helps them float


Simple pit pair

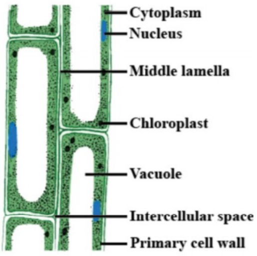
T.S. Sclerenchyma


Narrow lumen
Lignified thick wall

L.S. Sclerenchyma


Intercellular spaces

T.S. Parenchyma


Cytoplasm
Nucleus
Middle lamella
Chloroplast
Vacuole
Intercellular space
Primary cell wall

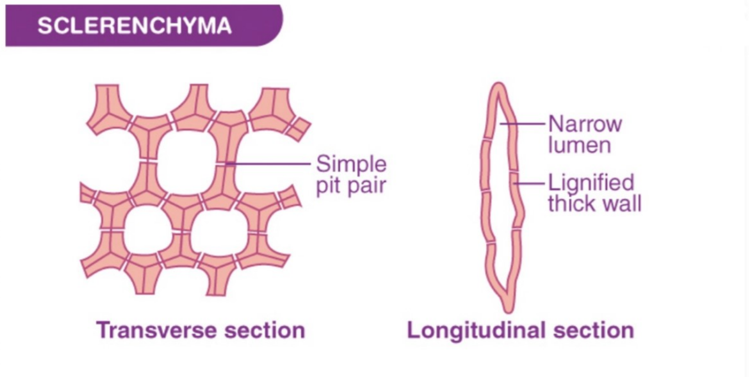
L.S. Parenchyma

## c) Sclerenchyma Tissue

- Provides toughness to the tissue

**Occurrence**: Outer parts

eg: bark, husk of coconut


SCLERENCHYMA
Simple pit pair
Narrow lumen
Lignified thick wall

Transverse section

Longitudinal section

## Protective Tissue (part of simple tissues)

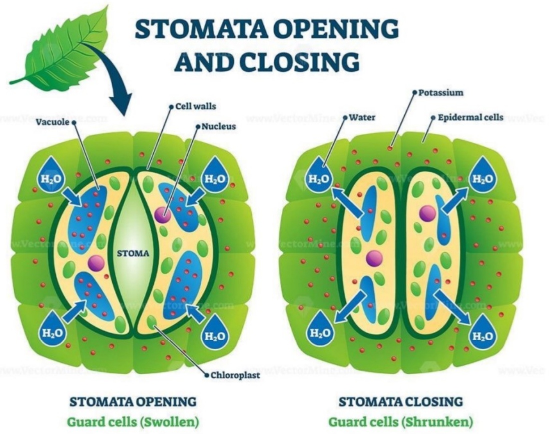
Types:
- Epidermis
- Cork

### a) Epidermis

- Occurrence: Outermost layer of plant parts
  eg: leaves, flowers, stem and roots

Functions:
- Protects all parts of plants
- Prevents water loss
- Plants of dry habitats have thicker epidermis — cactus plant

Epidermal cells on the aerial parts of plan secrete waxy secretions which prevents from:
- Water loss
- Injury
- Fungi infection


STOMATA OPENING AND CLOSING
Vacuole
Cell walls
Nucleus
STOMA
Chloroplast
$H_2O$
Water
Potassium
Epidermal cells
STOMATA OPENING
Guard cells (Swollen)
STOMATA CLOSING
Guard cells (Shrunken)

- Plants growing in desert have cuticle
- Layer of cutin is called cuticle
- Cutin is waxy materials and water resistant
- Cuticle aids in protection against water loss, injury and invasion of fungi
- Epidermal cells of the roots form hair like structures
- Long hair like parts increase absorption surface area of roots
- In leaves, epidermal cells form stomata
- Stomata are guarded by guard cells which are kidney shaped and regulate gaseous exchange

Types

### b) Cork

- Occurrence: in mature roots and shoots

### Functions:

- Protection to mature roots and shoots
- Suberin regulate gaseous exchange and water passage

## Complex Permanent Tissue

- Made up of more than one type of cells

### Function

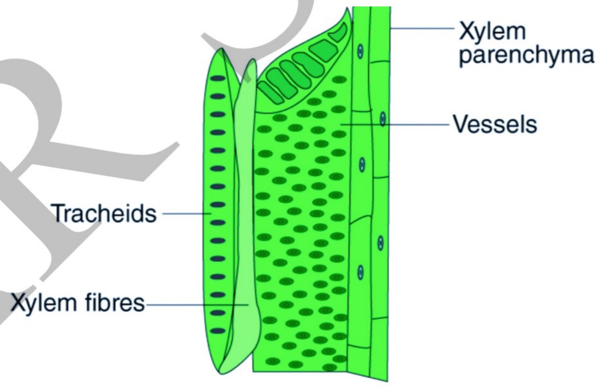
- Transport water, minerals and food materials

### Types

- Xylem
- Phloem

vascular tissues

Xylem


Xylem parenchyma
Vessels
Tracheids
Xylem fibres

## Xylem

- Conducting tissue (one-way conduction)
- Conducts water and minerals from roots to shoots

### Xylem Types:

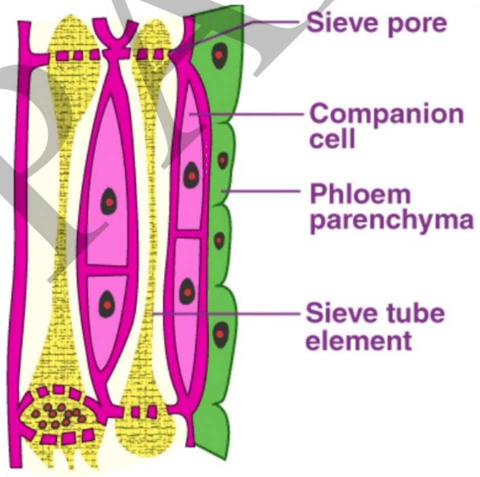
Living
- Xylem parenchyma: food storage
- Tracheids
- Vessels

- Xylem fibres

dead

## Phloem

- Conducts food (two-way conduction)


Sieve pore
Companion cell
Phloem parenchyma
Sieve tube element

Phloem Tissue

### Phloem Types:

- Sieve tubes
- Companion cells
- Phloem parenchyma: food storage
- Phloem fibers: rigidity and support

Animal Tissue

- Epithelial
  - Squamous
  - Cuboidal
  - Stratified
  - Ciliated
- Muscular
  - Striated
  - Smooth
  - Cardiac
- Connective
  - Areolar
  - Adipose
  - Skeletal
  - Fluid
- Nervous

## a) Epithelial

### Characteristics

- Covering/protective tissues of animal body

### Function

- Protection to body from injury and damage

### Types

### i) Squamous Epithelial Tissue

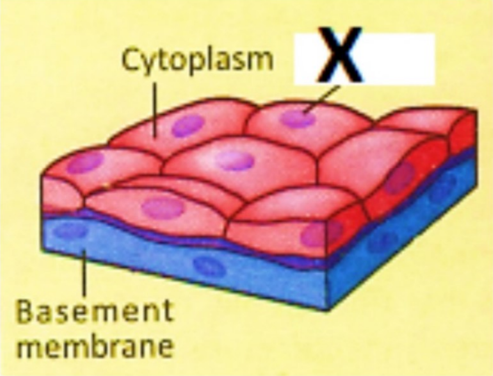
### Types

### a) Simple Squamous Tissue

- Single layer of cells
- Forms delicate lining

eg: mouth and oesophagus

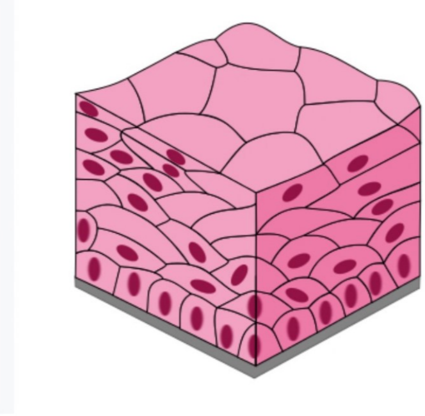
food pipe



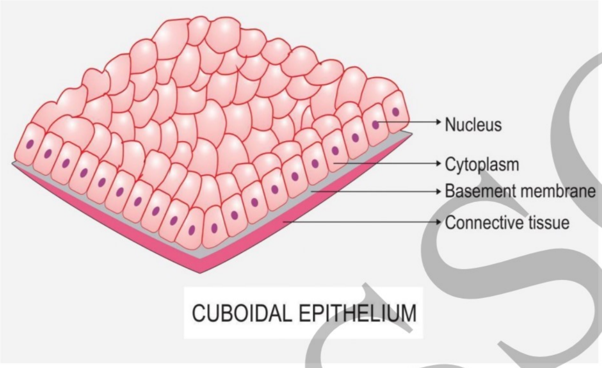
### b) Stratified Squamous Tissue

- Cells are arranged in layers
- Prevent wear and tear

eg: Skin



## ii) Cuboidal Epithelial Tissue


Nucleus
Cytoplasm
Basement membrane
Connective tissue

CUBOIDAL EPITHELIUM

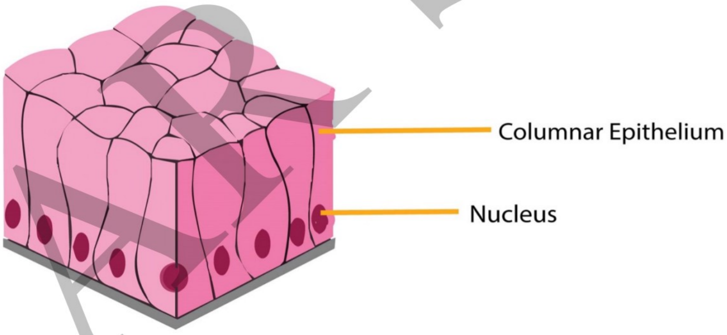
### Structure

- Cube like

### Occurrence

- Sweat glands
- Salivary glands
- Thyroid glands
- Lining of Kidney tubules

## iii) Columnar Epithelial Tissue


Columnar Epithelium
Nucleus

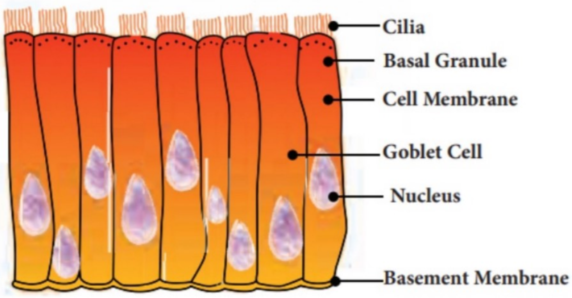
### Structure

- Pillar like cells
- Tall > Wide

### Occurrence

- Lining of intestine
- Lining of stomach, gallbladder

## iii) Ciliated Epithelial Tissue


Cilia
Basal Granule
Cell Membrane
Goblet Cell
Nucleus
Basement Membrane

### Structure

- Cuboidal/Columnar cells
- Cells have hair like projections on free surface called "cilia", which facilitates movement

### Occurrence

- Respiratory tract
- Urinary tubules or kidney

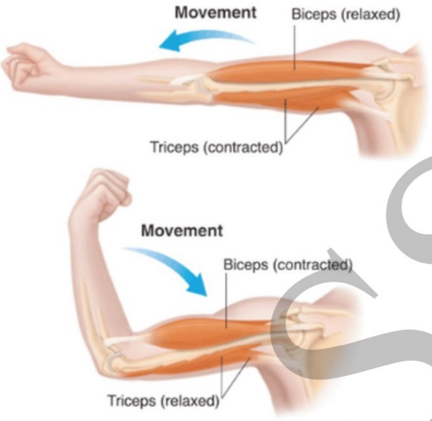
## b) Muscular Tissue/ Muscle Tissue

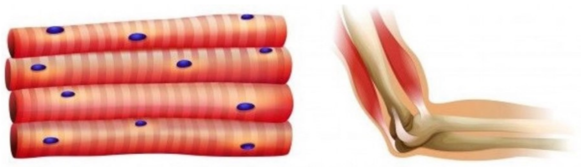
### Function

- Movement of body

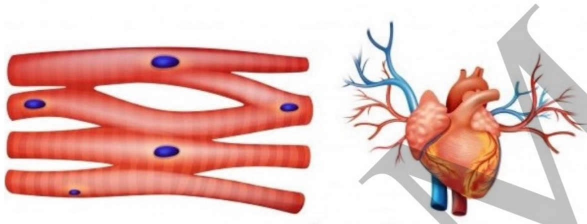
### Types

- Cardiac muscle
- Skeletal muscle
- Smooth muscle

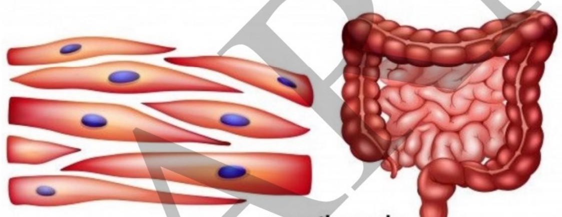

Movement
Biceps (relaxed)
Triceps (contracted)
Movement
Biceps (contracted)
Triceps (relaxed)



skeletal muscle



cardiac muscle



smooth muscle

### a) Skeletal Muscle

- Muscle fibres are elongated and cylindrical
- Fast in nature

  Unbranched
- Each cell is multinucleated (many nuclei)
- Striations are present (alternate dark and light bands
- Easily fatigue

### Occurrence

- Biceps, bone

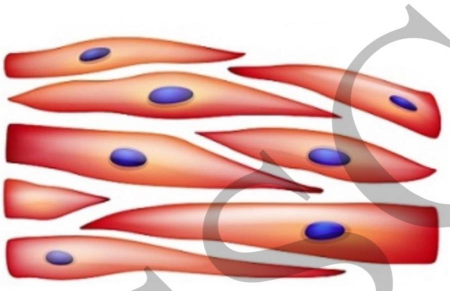
### Other names

- Attached to skeletal: Skeleton Muscles
- Striations are present: Striated Muscles
- Are under our control: Voluntary muscles

## b) Smooth/Visceral Muscles

- Nucleus located at the centre of each cell
- Striations are absent
- Unbranched
- Slow
- Do not fatigue

soft interior organs: lung, liver, abdomen, intestines

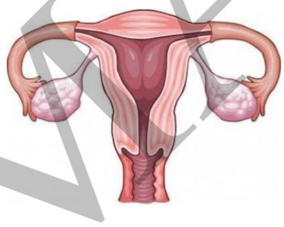

BlueRingMedia/Shutterstock.com

Other names

- Found in visceral organs: Visceral Muscles
- Striations are absent: Unstriated muscles
- Not under our control: Involuntary Muscles

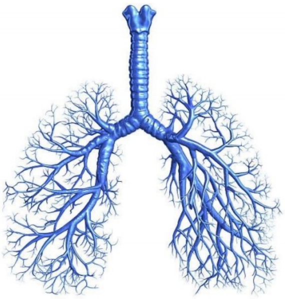
### Organs like; that have visceral muscles

Intestine


Uterus

Blood vessels

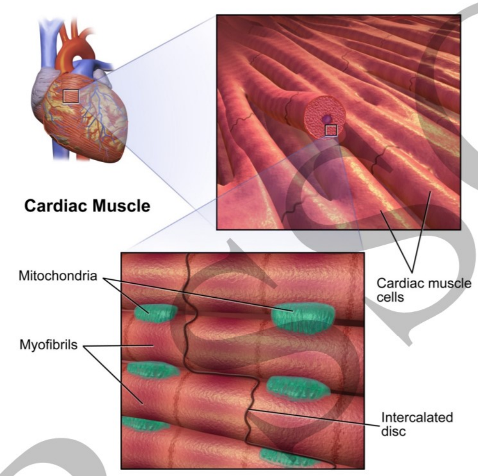
Stomach


Bronchi

Iris

## c) Cardiac Muscles

- Fibres are cylindrical in shape
- Each fibre is uninucleated
- Fibres are branched
- Striations are present
- Do not fatigue

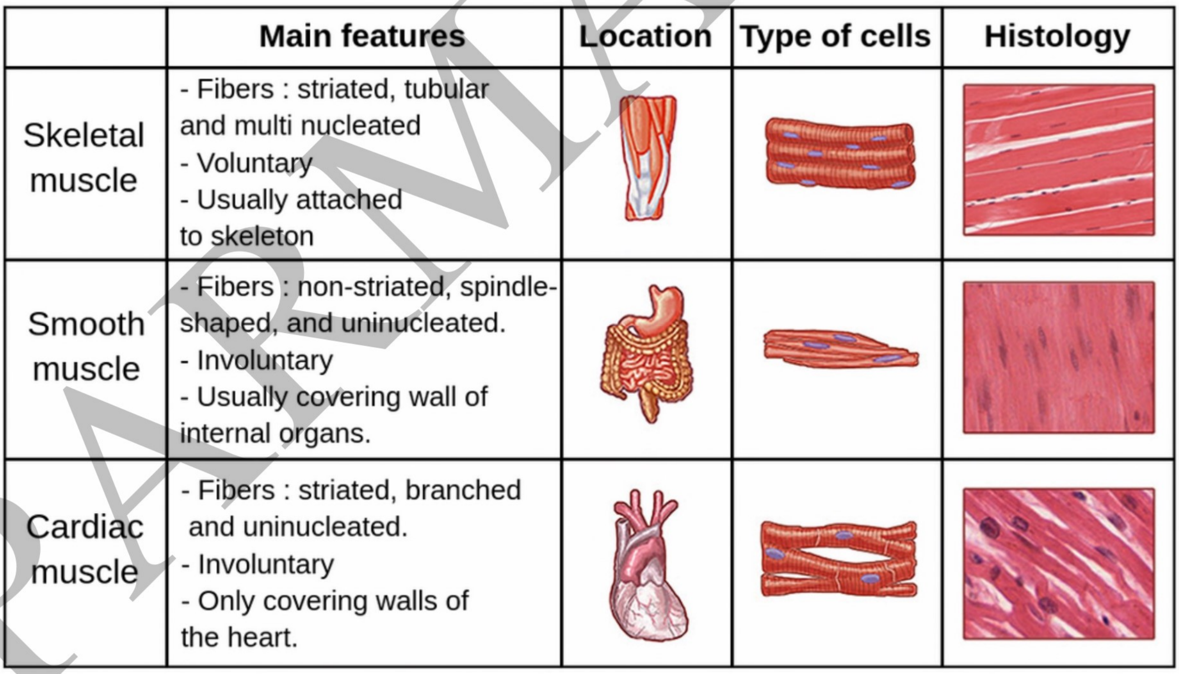


### Other names

- Cardiac muscle: only present in heart
- Striated: Striations are present
- Not under our control: Involuntary muscles

### Function

- Perform contraction and relaxation in wall of heart
- Help to pump and distribute blood to body



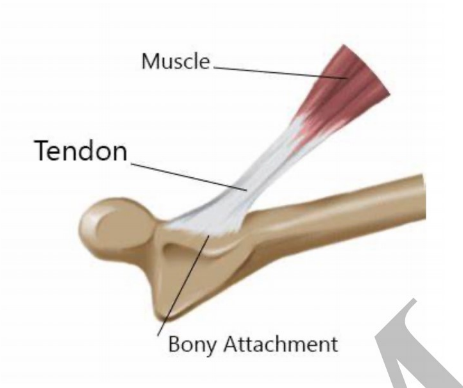
| | Main features | Location | Type of cells | Histology |
|---|---|---|---|---|
| Skeletal muscle | - Fibers : striated, tubular and multi nucleated<br>- Voluntary<br>- Usually attached to skeleton | | | |
| Smooth muscle | - Fibers : non-striated, spindle-shaped, and uninucleated.<br>- Involuntary<br>- Usually covering wall of internal organs. | | | |
| Cardiac muscle | - Fibers : striated, branched and uninucleated.<br>- Involuntary<br>- Only covering walls of the heart. | | | |

**Figure 1.** Key features of skeletal, smooth and cardiac muscle.

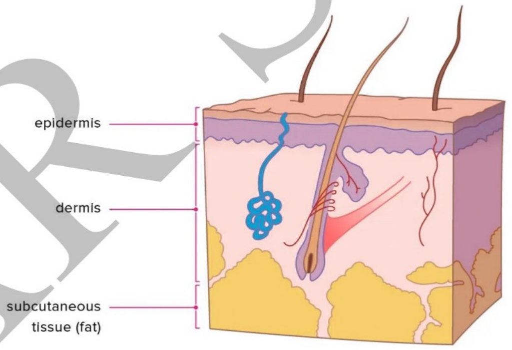
## c) Connective Tissue

- Connects various body parts
- Cells are embedded in an intracellular matrix
- Matrix may be jelly, fluid, dense or rigid

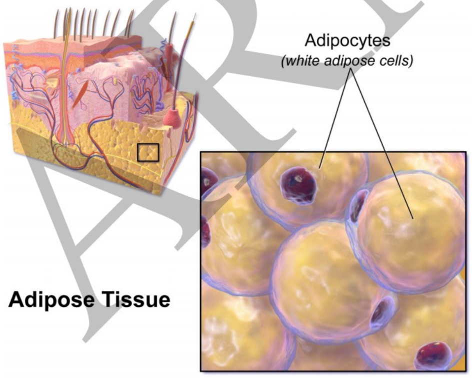
Cartilage Blood Bone


Muscle
Tendon
Bony Attachment

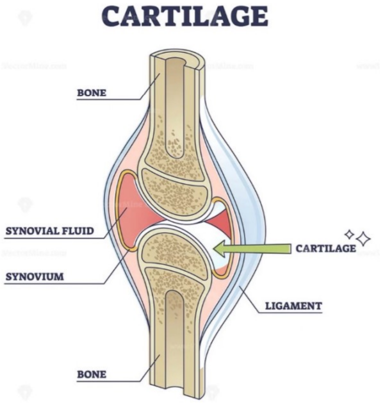
Tendons


epidermis
dermis
subcutaneous tissue (fat)

Dermis


Adipocytes
(white adipose cells)
Adipose Tissue

Adipose


CARTILAGE
BONE
SYNOVIAL FLUID
SYNOVIUM
CARTILAGE
LIGAMENT
BONE

Cartilage

## Types of Connective tissue

### a) Areolar Connective Tissue

i) Loose Connective Tissue
ii) Dense Connective Tissue
- Ligaments
- Tendons

### b) Adipose Connective Tissue

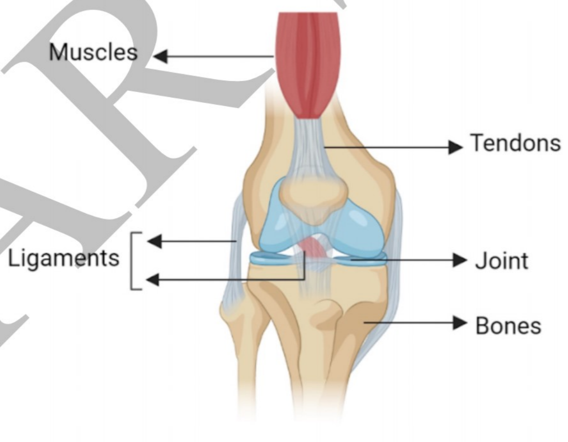
## ii) Dense Connective Tissue

### a) Tendons

- Fibrous tissue
- Great strength
- Limited flexibility
- Connects muscles to bones

Muscle — **Tendon** — Bone

Bone — **Ligament** — Bone



**Tendons and Ligaments**

### b) Ligaments

- Considerable strength
- Little matrix is present
- Connects bones to bones

## b) Adipose Connective Tissue

**Structure**

- Aggregation of fat cells

**Occurrence**

Below the skin — fatty people have more adipose tissue

Bet$^n$ internal organs

### c) Skeletal Connective Tissue

**Types**

- Cartilage
- Bones
  - 300 bones: child
  - 206 bones: adult

Longest bone: Femur

Shortest bone: Stapes

### i) Cartilage

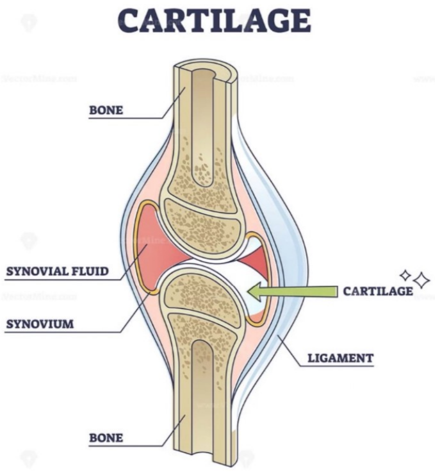
- Widely spaced out cells
- Matrix is gel-like
- Matrix is slightly elastic
- Cartilage is flexible

**Occurrence**

- Ear pinna, nose tip, trachea, larynx
- Smoothens bone surfaces at joints

**Function**

- Support and flexibility to body parts


CARTILAGE
BONE
SYNOVIAL FLUID
SYNOVIUM
CARTILAGE
LIGAMENT
BONE

### ii) Bones

- Very strong
- Non flexible
- Hard and rigid
- Matrix is hard and composed of calcium and phosphorous compounds

**Functions**

- Forms a framework
- Supports the body
- Provides shape to body
- Protects vital body organs like brain, lungs, etc.

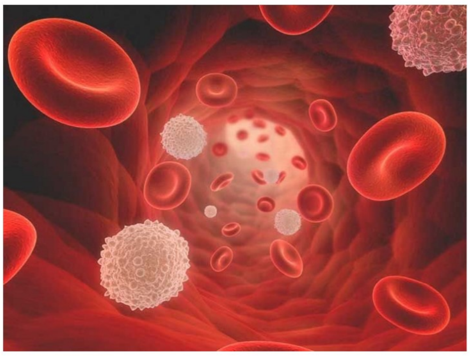
Layer: meningitis

22 bones in brain

- 8: cranial
- 14: facial

## d) Fluid Connective Tissue

Connects different part of the body
Maintains a continuity



**Types**

- Blood
- Lymph

### i) Blood

Blood

**Function:** transports gases, digested food, hormones, waste materials

- Liquid
  - Plasma: 90% water
    Remaining: Protein, salts, hormones
- Solid
  - RBC
  - WBC
  - Platelets

## Solid

### RBC

- red in colour due to presence of heme (Fe)
- Heme has high affinity towards oxygen
- Heme transports oxygen throughout the body to carry out respiration to produce energy
- Graveyard of RBC: Spleen
- Shape: Biconcave; disc-shaped
- Also known as erythrocytes

Time period of
RBC: 120 days
End point: Spleen

### WBC

- Also known as leukocytes
- Prevent from infection, provide our body a defence mechanism
- Is formed in bone marrow

Types
- Monocytes
- Lymphocytes
- Neutrophils
- Basophils
- Eosinophils

- Shape: round/irregular

Life span: 12 days

### Platelets

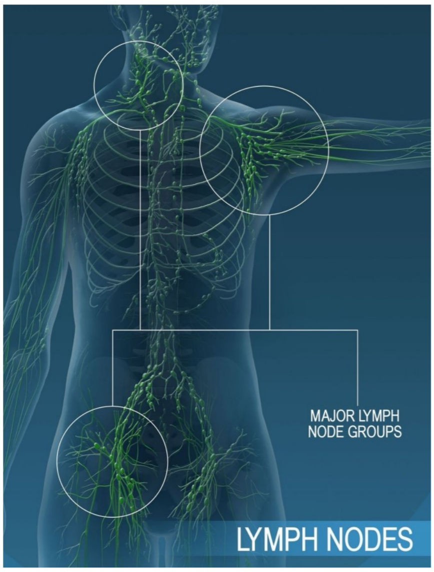
- Helps in blood clotting
- If suffering from dengue, it reduces
- Also known as thrombocytes

Order in number:

RBC > Platelets > WBCs

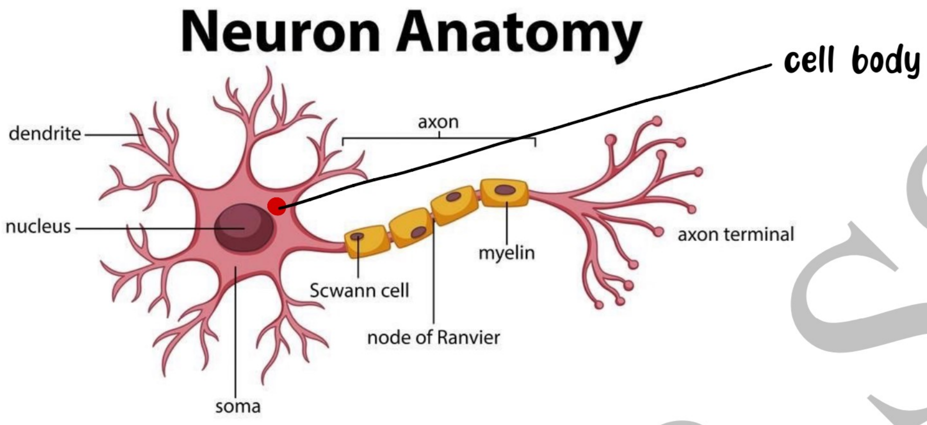
- study of blood: hematology

## ii) Lymph



Structure
- Colourless fluid
- RBCs and Blood proteins are absent

## d) Nervous Tissue


Neuron Anatomy
cell body
dendrite
axon
nucleus
myelin
axon terminal
Scwann cell
node of Ranvier
soma

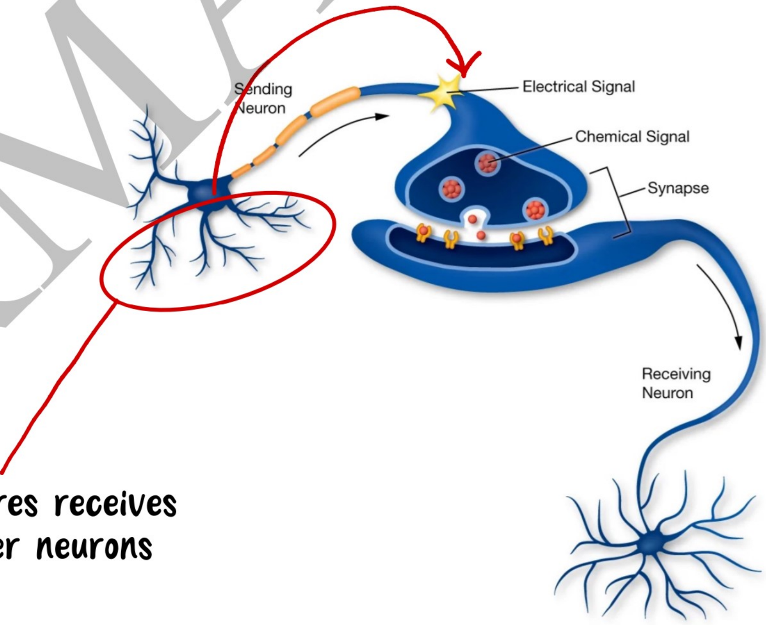
- Found in brain, spinal cord, nerves
- Fundamental unit of nervous system: Neuron

- Fundamental unit of kidney: Nephron
- Study of kidney: Nephrology

Function

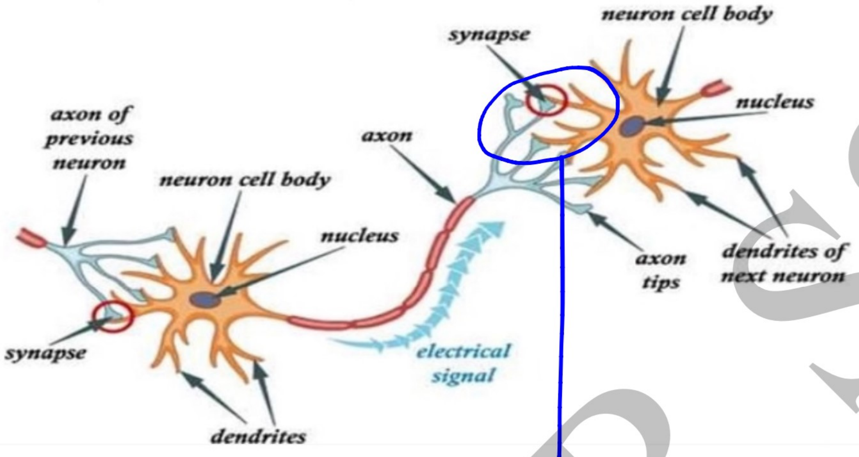
Sense stimuli:

- Touch
- Smell
- Taste
- Hearing
- Sight


Sending Neuron
Electrical Signal
Chemical Signal
Synapse
Receiving Neuron

Hair like structures receives signals from other neurons

How do neurons transmit impulses (send message to other cells)?


neuron cell body
synapse
nucleus
axon of previous neuron
axon
neuron cell body
nucleus
axon tips
dendrites of next neuron
synapse
electrical signal
dendrites

one neuron's dendrite transmit information to other neuron's cell body

- The gap betⁿ these two is called synapse

- Camel hump is made of: Adipose tissue

PARMAR
SSC

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Plant & Animal Kingdom
## पादप - प्राणी जगत

### Lecture :-3

✓ For Notes Join Telegram :

Click on the icon.

OR
Scan

✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

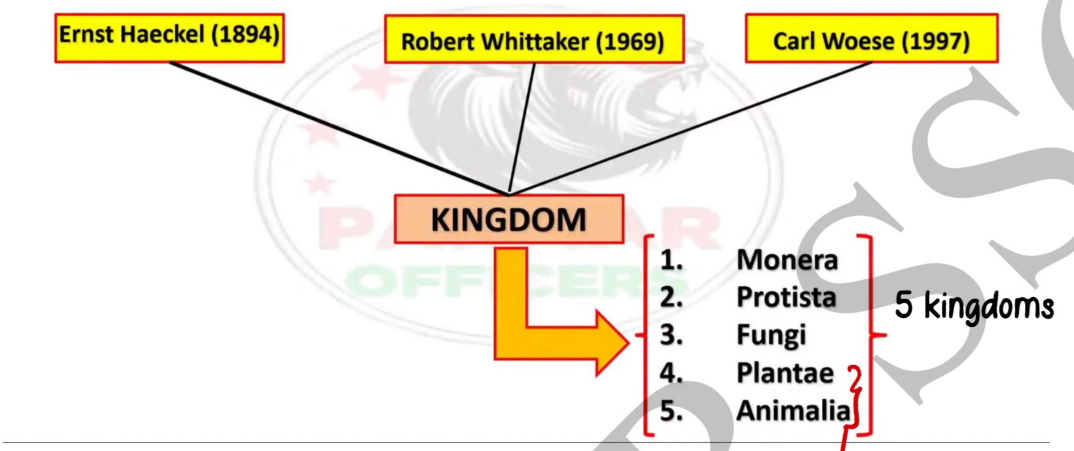
Click on the icon.

OR
Scan

# Plant and Animal Kingdom

ANIMALS
PLANTS
FUNGI
PROTISTS
BACTERIA

## The Hierarchy of Classification - Groups


Ernst Haeckel (1894)
Robert Whittaker (1969)
Carl Woese (1997)

KINGDOM

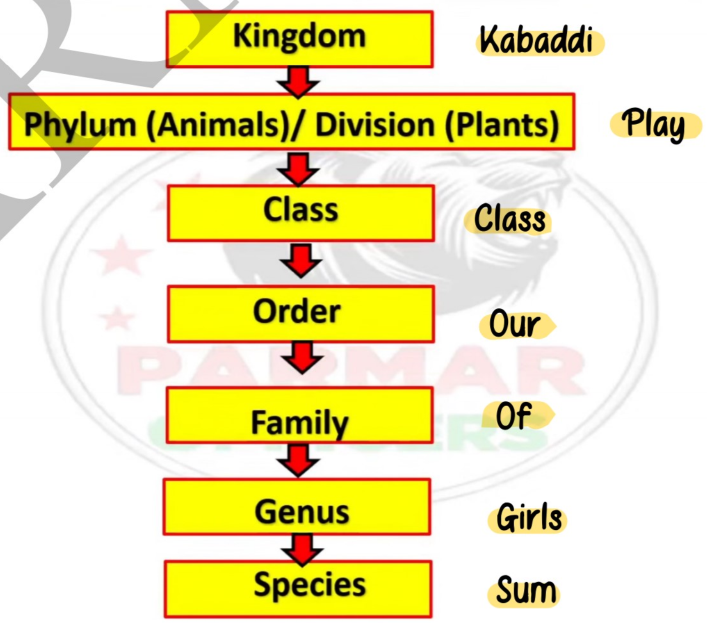
1. Monera
2. Protista
3. Fungi
4. Plantae
5. Animalia

5 kingdoms

These two kingdoms very important

- 5 kingdoms classification by Robert Whittaker in 1969
- Ernst Haeckel in 1866 coined the term "Ecology"
- Father of Indian ecology: Ramdeo Mishra

TRICK to learn the order


Kingdom — Kabaddi
Phylum (Animals)/ Division (Plants) — Play
Class — Class
Order — Our
Family — Of
Genus — Girls
Species — Sum

Classification is based on following:

- Prokaryote v/s Eukaryote cell structure
- Unicellular/Multicellular organization
- Moses of nutrition
- Further classification is done into sub groups

## KINGDOM MONERA

- Microscopic
- Prokaryotic

eg: Archaebacteria, Eubacteria, Cynobacteria (Blue-green algae)

## KINGDOM PROTISTA

### Characteristics

- Unicellular eukaryotic organisms
- Locomotion through appendages
- Cell wall is absent except Euglena

### Mode of Nutrition

- Autotrophic/Heterotrophic

eg: Unicellular algae, diatoms, protozoa

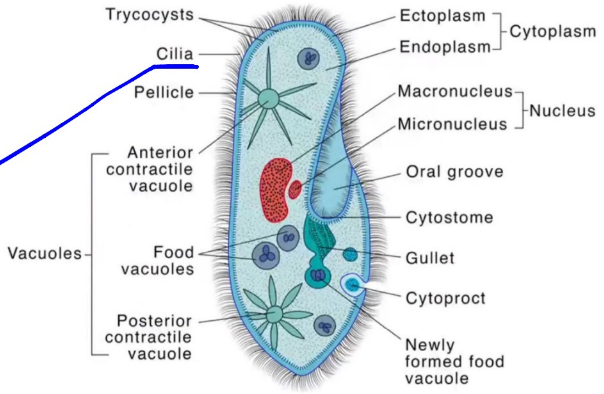
### Classification of kingdom Protista

### PHYLUM PROTOZOA

- Unicellular
- free living/parasitic/symbiotic

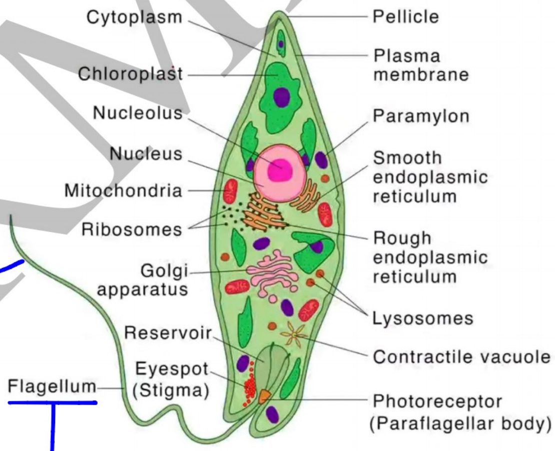
eg: Euglena, Amoeba, Paramecium

## Paramecium


Trycocysts
Cilia
Pellicle
Anterior contractile vacuole
Vacuoles
Food vacuoles
Posterior contractile vacuole
Ectoplasm
Endoplasm
Cytoplasm
Macronucleus
Micronucleus
Nucleus
Oral groove
Cytostome
Gullet
Cytoproct
Newly formed food vacuole

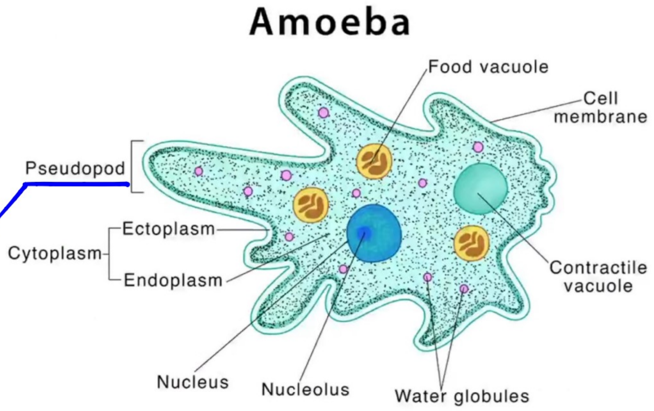
- Helps in movement/locomotion
- Also, helps to move food to its oral cavity

## Euglena


Cytoplasm
Chloroplast
Nucleolus
Nucleus
Mitochondria
Ribosomes
Golgi apparatus
Reservoir
Eyespot (Stigma)
Flagellum
Pellicle
Plasma membrane
Paramylon
Smooth endoplasmic reticulum
Rough endoplasmic reticulum
Lysosomes
Contractile vacuole
Photoreceptor (Paraflagellar body)

Euglena has a tail-like structure

Helps in cell movement


Amoeba
Food vacuole
Cell membrane
Pseudopod
Ectoplasm
Cytoplasm
Endoplasm
Contractile vacuole
Nucleus
Nucleolus
Water globules

false feet

## KINGDOM FUNGI

**Fungus on Bread**

**Mushroom**

### Characteristics

- Multicellular except yeast
- Cell wall is present and is made of complex sugar chitin

- Some are in symbiotic relationship — benefit from each other

  eg: Lichen – Blue green algae + fungi

  - changes colour due to global warming
  - gives food to fungus
  - gives water + shelter + minerals to algae

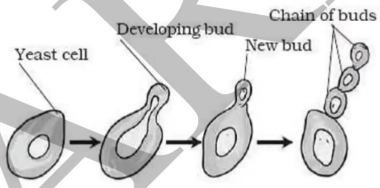
- India's first lichen park: Uttarakhand

- Used in medicine: Penicillin — Alexander Fleming discovered Penicillin
- Used in bakery: Yeast

## Mode of nutrition

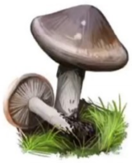
- Heterotrophic
- Saprophytic: Decaying organic material as food
- Parasitic: Dependent on protoplasm of a host organism for food

### Types of fungi :-



Saccharomyces
(Yeast)

Penicillium
(Mold)



Agaricus
(Mushroom)

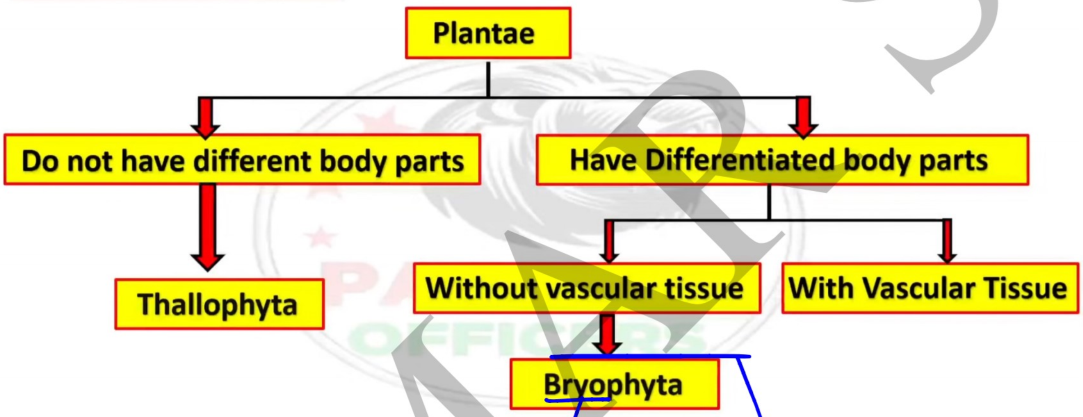
# KINGDOM PLANTAE

- Multicellular
- Eukaryotes
- Cell Wall present

Cellulose

- Autotrophs in nature
- Sedentary

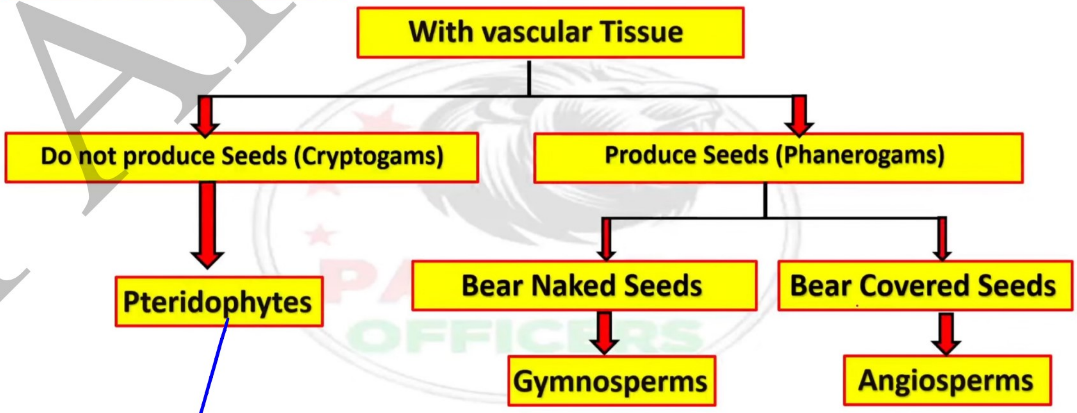
## Classification of Plantae:-


Plantae
Do not have different body parts
Have Differentiated body parts
Thallophyta
Without vascular tissue
With Vascular Tissue
Bryophyta

without

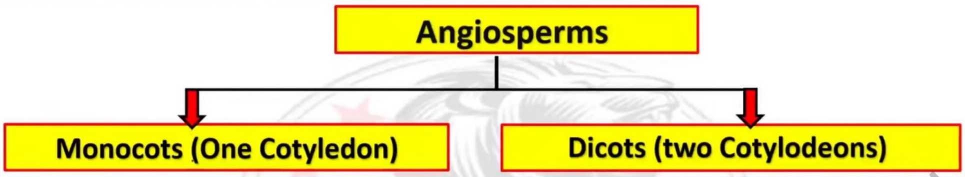
conducting tissue

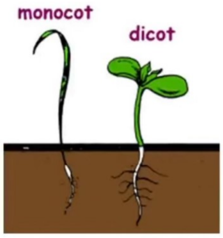
## Classification of Plantae:-

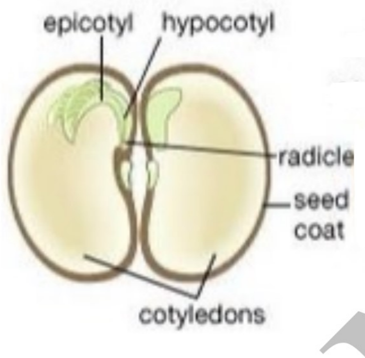

With vascular Tissue
Do not produce Seeds (Cryptogams)
Produce Seeds (Phanerogams)
Pteridophytes
Bear Naked Seeds
Bear Covered Seeds
Gymnosperms
Angiosperms

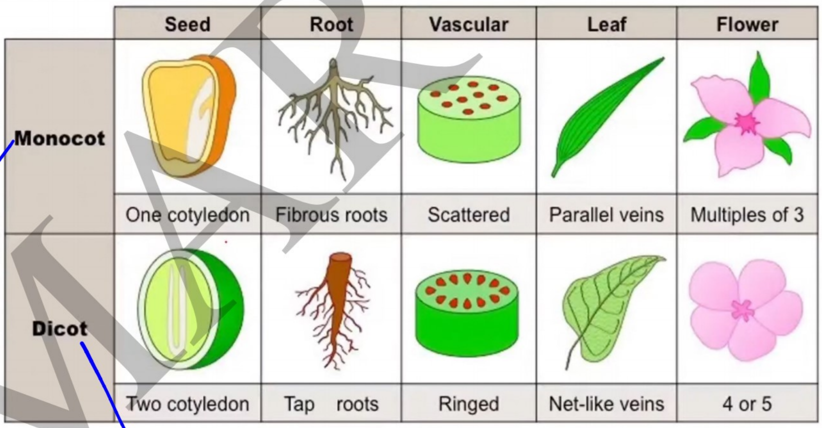
hidden reproductive organs

## Classification of Plantae:-


Angiosperms
Monocots (One Cotyledon)
Dicots (two Cotylodeons)


monocot
dicot


epicotyl
hypocotyl
radicle
seed coat
cotyledons



| | Seed | Root | Vascular | Leaf | Flower |
|---|---|---|---|---|---|
| **Monocot** | One cotyledon | Fibrous roots | Scattered | Parallel veins | Multiples of 3 |
| **Dicot** | Two cotyledon | Tap roots | Ringed | Net-like veins | 4 or 5 |

single cotyledon

Two cotyledons

## PHYLUMS OF KINGDOM PLANTAE

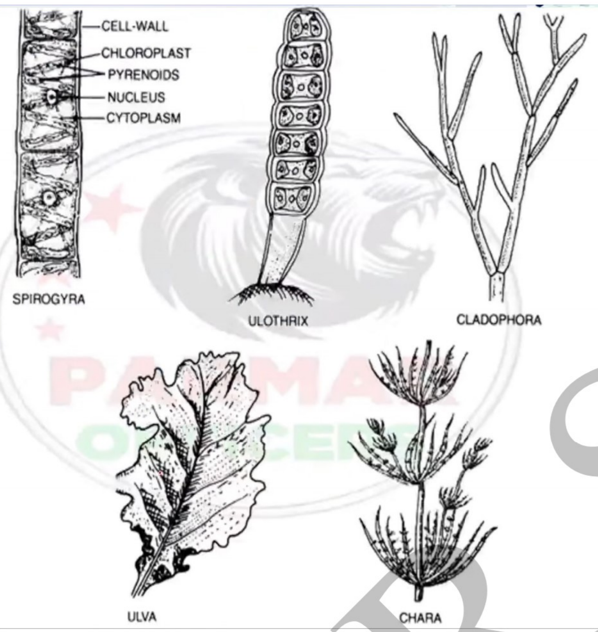
### Characteristics of Thallophyta

- Plants do have well-differentiated body parts
- Plants are called as algae
- Mostly aquatic

eg: Spirogyra, Ulothrix, Ulva, and Chara

no distinguished root or stem or body

**Thallophyta - Algae**

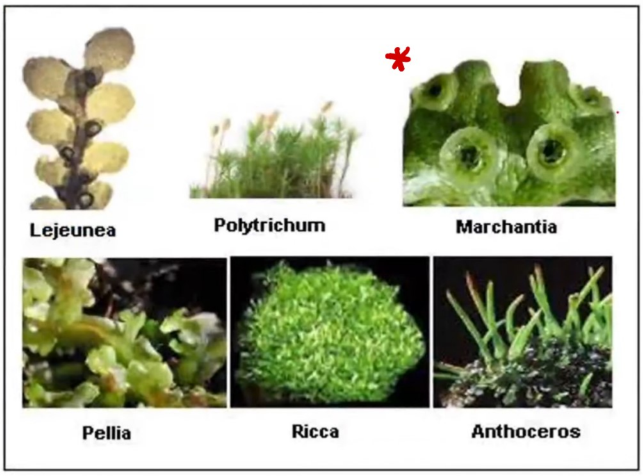

CELL-WALL
CHLOROPLAST
PYRENOIDS
NUCLEUS
CYTOPLASM
SPIROGYRA
ULOTHRIX
CLADOPHORA
ULVA
CHARA

## Characteristics of Bryophyta

- They are known as "Amphibians of Plant Kingdom"
- Well differentiated body: Stem and leaves
- Root like structures present: Rhizoids
- Autotrophic
- No specialised tissues for water and food conduction
- Found in damp and moist areas

eg: Ricia, Moss (funaria), Marchantia

**Bryophyta:-**


Lejeunea
Polytrichum
*
Marchantia
Pellia
Ricca
Anthoceros

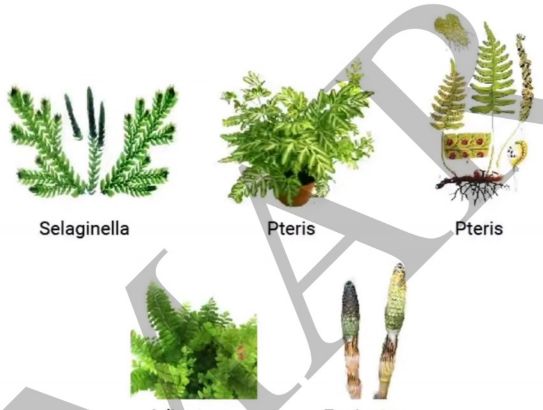
## Characteristics of Pteridophyta

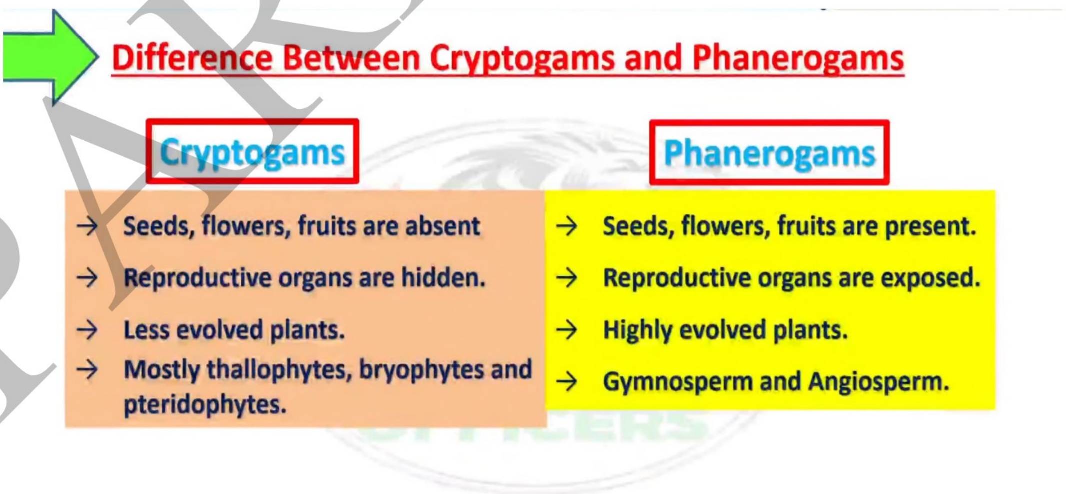
zameen par

- First terrestrial plants
- Well-differentiated into roots, stem, and leaves
- Well-developed reproductive organs are hidden
- Specialised tissue for food and water conduction: Vascular tissues are present

eg: Marsilea and fern

## Pteridophyta


Selaginella Pteris Pteris
Adiantum Equisetum



### Difference Between Cryptogams and Phanerogams

| Cryptogams | Phanerogams |
|---|---|
| → Seeds, flowers, fruits are absent | → Seeds, flowers, fruits are present. |
| → Reproductive organs are hidden. | → Reproductive organs are exposed. |
| → Less evolved plants. | → Highly evolved plants. |
| → Mostly thallophytes, bryophytes and pteridophytes. | → Gymnosperm and Angiosperm. |

## Characteristics of Gymnosperms

- Gymno: Without cover
- Sperma: Seeds without fruit
- Usually perennials, evergreen and mostly woody plants
- True roots, stem, and leaves are present
- Xylem vessel absent

eg: Pinnes and Deodar

Pinus

coniferous forest: in
temperate regions

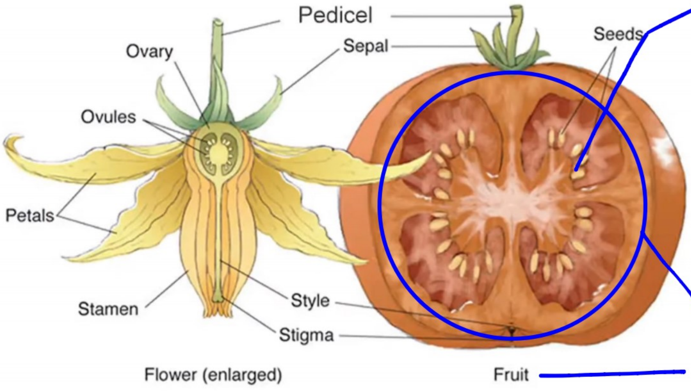
**Pines**

**Deodar**

## Characteristics of Angiosperms

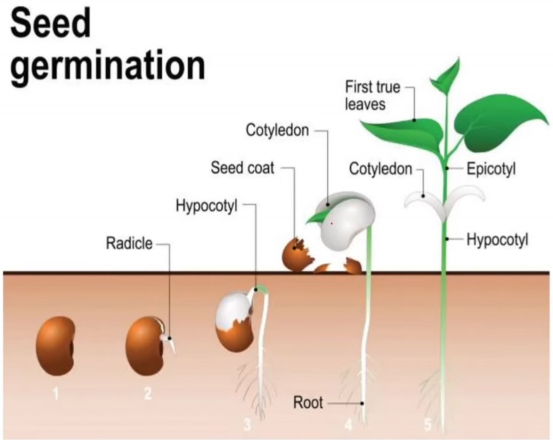
- Angio: Covered
- Sperma: Seed
- They are flowering plants and produce seeds enclosed within fruit
- They are highly evolved
- Ovary gets modified into fruit
- Seeds have embryo inside it and these seeds develop inside ovary
- Embryos have structure: Cotyledons — seed leaves

**Flower to fruit:-**


Pedicel
Ovary
Sepal
Seeds
Ovules
Petals
Stamen
Style
Stigma
Flower (enlarged)
Fruit

seeds that were
earlier ovules

that was earlier
ovary


Seed germination
First true leaves
Cotyledon
Seed coat
Cotyledon
Epicotyl
Hypocotyl
Radicle
Hypocotyl
Root
1
2
3
4
5

## KINGDOM ANIMALIA

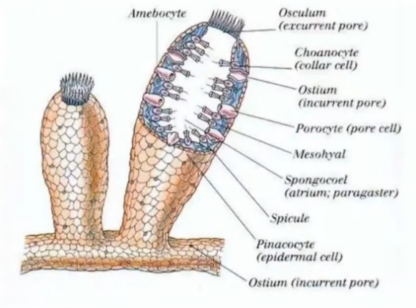
- Eukaryotic
- Multicellular
- Heterotrophic
- Cell wall absent
- Most of them are mobile

## Characteristics of Porifera

- They have holes called pores i.e. body is perforated that is why called sponges
- Have water canal system (pores se paani)
- Asymmetrical body
- Cellular level organization
- Two layer germ layers: Diploblastic
- Exclusively aquatic

Ectoderm: cells outside the body

Endoderm: cells inside the body

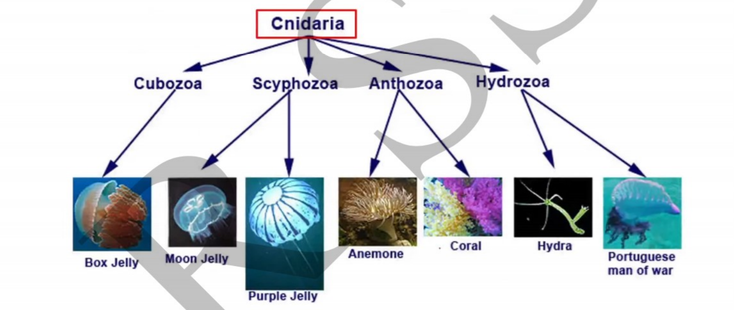

Amebocyte
Osculum (excurrent pore)
Choanocyte (collar cell)
Ostium (incurrent pore)
Porocyte (pore cell)
Mesohyal
Spongocoel (atrium; paragaster)
Spicule
Pinacocyte (epidermal cell)
Ostium (incurrent pore)

Scyon

## Characteristics of Coelenterata/Cnidaria

- Aquatic animals
- Tissue level organisation
- Hard skeleton developed outside called Exoskeleton made of calcium carbonate
- Body made of two layers: Diploblastic
- Anus is absent
- Radial symmetry (divided in equal parts from anywhere)
- Central gastrovascular cavity is present

eg: Coral and hydra

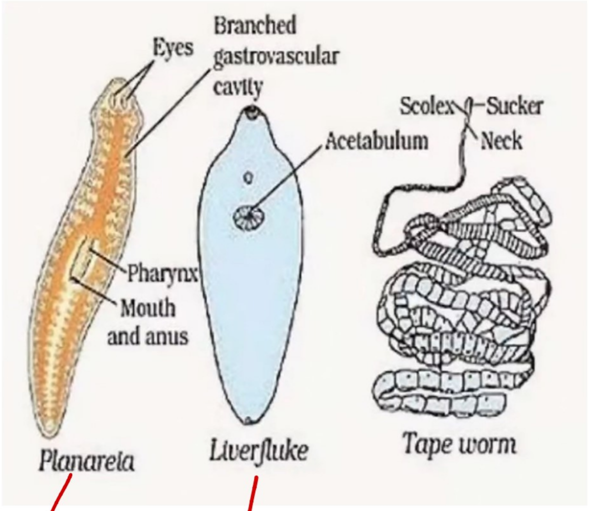

Cnidaria
Cubozoa
Scyphozoa
Anthozoa
Hydrozoa
Box Jelly
Moon Jelly
Purple Jelly
Anemone
Coral
Hydra
Portuguese man of war

## Characteristics of Platyhelminthes

- They have flattened body, dorsoventrally
- Bilateral symmetry
- Organ level organisation
- Triploblastic animals: three germ layers
- True internal cavity/coelom absent: Acoelomate

Body cavity

- They can be parasitic or free living


Eyes
Branched gastrovascular cavity
Pharynx
Mouth and anus
Acetabulum
Scolex
Sucker
Neck
Planareia
Liverfluke
Tape worm

Free living

Parasite

## Characteristics of Nematodes/Aschelmithes

- Body is cylindrical
- Bilateral symmetry
- Triploblastic organisation
- Organ level organisation
- No real organs present

  Pseudocoelom present

  false cavity
- Alimentary is complete: mouth and anus (entry and exit point same)

  eg: Elephantiasis (filarial worms)

  Worms in intestines (roundworms/pinworms)
- Sexes are separate

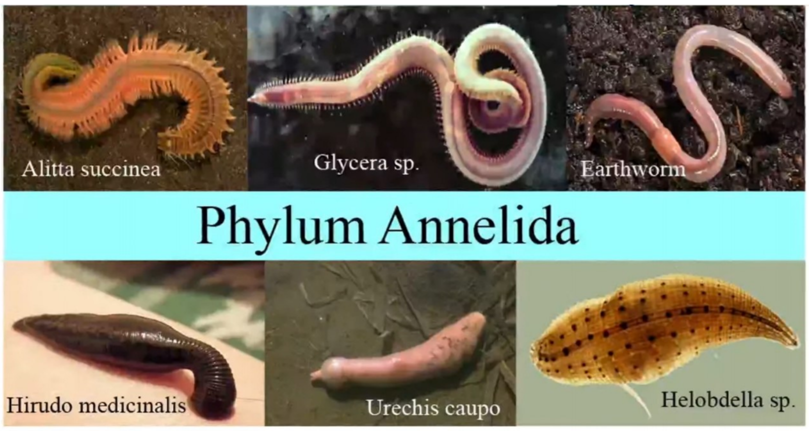
Phylum Nematoda

Hermaphrodite: having both male and female part

Unisexual: either male or female part

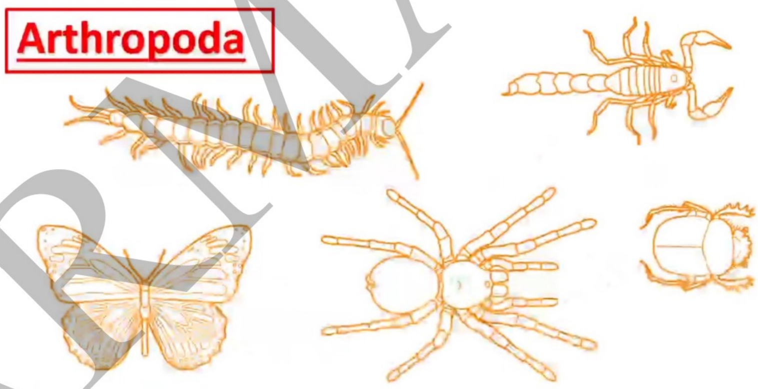
## Characteristics of Annelida

- Bilaterally symmetrical
- Triploblastic
- Cylindrical/dorsoventrally flattened
- Brown colour skin is present
- True coelomate animal
- True organ packaged in coelom
- Organ level organisation
- Body segmetation is present
- Reproduction: Sexually


Alitta succinea
Glycera sp.
Earthworm
Phylum Annelida
Hirudo medicinalis
Urechis caupo
Helobdella sp.

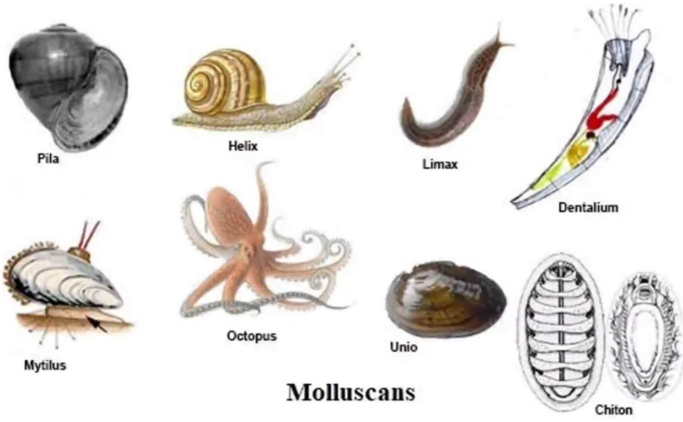
## Characteristics of Arthropoda

- Largest phylum in animal kingdom
- They have jointed legs
- Bilateral symmetry
- Segmented body into head, thorax/cahals thorax, abdomen
- Open circulatory system (blood openly flows; not through a blood vessel)
- Coelom is present and is blood filled
- Triploblastic
- Respiration through gills, trachea
- Excreation through Malpighian Tubules
- Exoskeleton is made of chitin
- Unisexual


Arthropoda

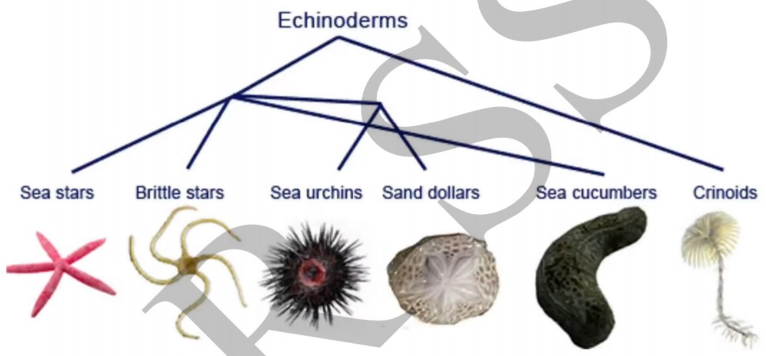
## Characteristics of Mollusca

- Body is soft
- Exoskeleton is hard (snails)
- Little segmentation
- Open circulatory system


Pila
Helix
Limax
Dentalium
Mytilus
Octopus
Unio
Chiton
Molluscans

Blue colour blood: Haemocyanin
Alimentary canal is complete
Kidney like organs for excretion is present
Respiration through gills
Unisexual

## Characteristics of Echinodermata


Echinoderms
Sea stars
Brittle stars
Sea urchins
Sand dollars
Sea cucumbers
Crinoids

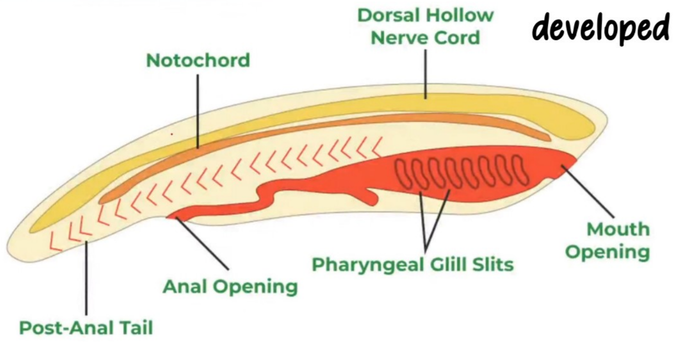
- Spiny skinned organism
- Star shaped, spherical, elongated
- Radial symmetry
- Triploblastic
- Coelomic cavity is present
- No segmentation
- Organ level system

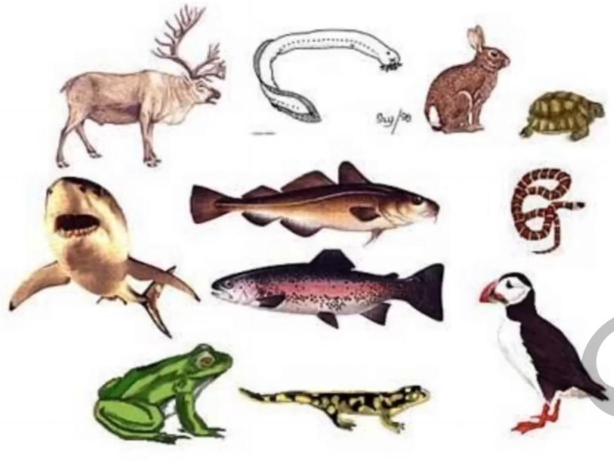
## Characteristics of Chordata

They have notochord: rod like structure
Paired gills slits in pharynx
Bilateral
Triploblastic
Organ system level organisation
Closed blood vascular system

Types:
a) Protochordata — Notochord not developed properly
b) Vertebrata — Notochord properly developed

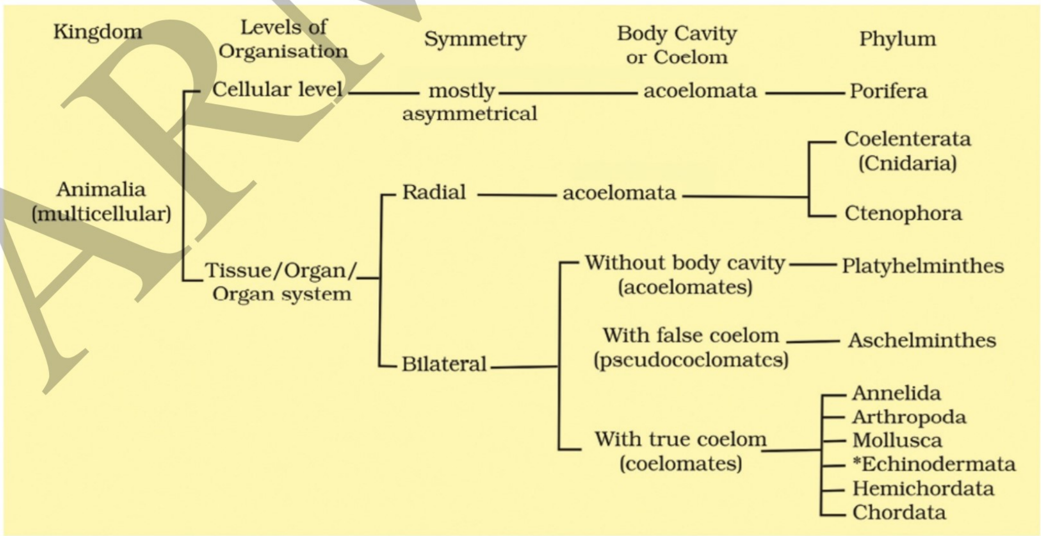
Basic structure of Chordates


Dorsal Hollow Nerve Cord
Notochord
Mouth Opening
Pharyngeal Glill Slits
Anal Opening
Post-Anal Tail



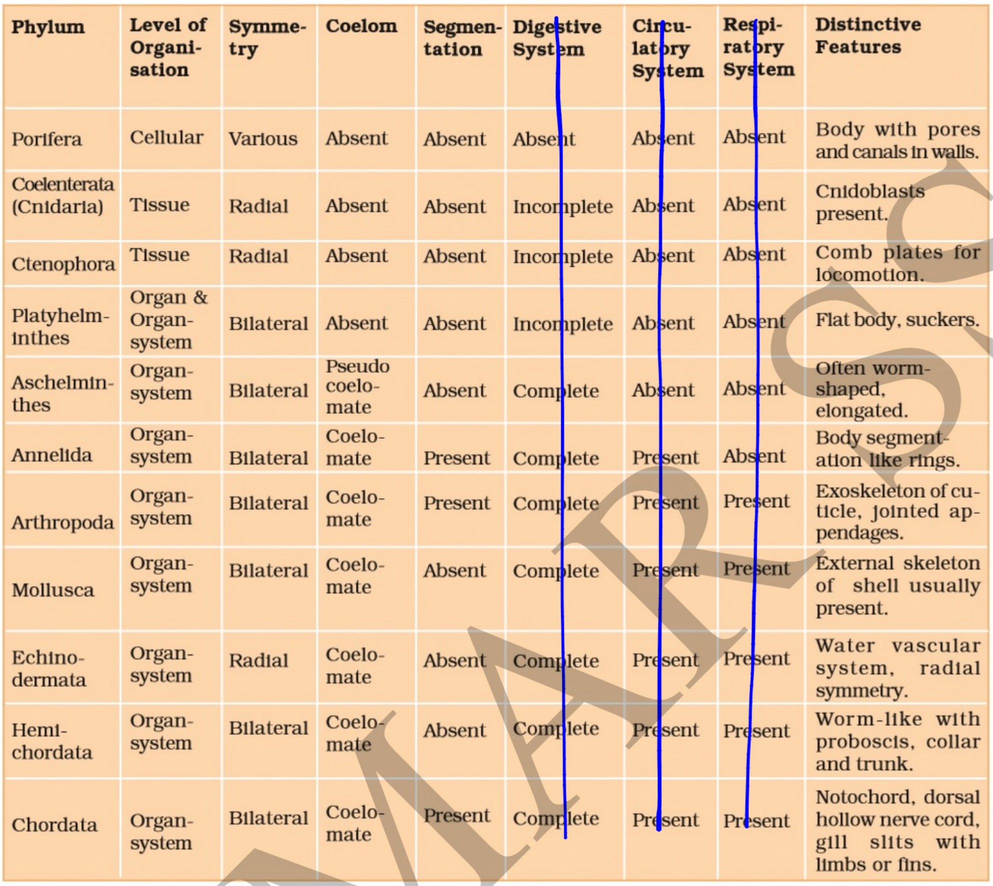
## Characteristics of Protochordata

- Do not have proper notochord present during all stages of life
- Bilaterally symmetrical
- Triploblastic
- Coelomate animals


Kingdom
Levels of Organisation
Symmetry
Body Cavity or Coelom
Phylum
Cellular level
mostly asymmetrical
acoelomata
Porifera
Animalia (multicellular)
Radial
acoelomata
Coelenterata (Cnidaria)
Ctenophora
Tissue/Organ/ Organ system
Without body cavity (acoelomates)
Platyhelminthes
With false coelom (pseudocoelomates)
Aschelminthes
Bilateral
With true coelom (coelomates)
Annelida
Arthropoda
Mollusca
*Echinodermata
Hemichordata
Chordata

*Echinodermata exhibits radial or bilateral symmetry depending on the stage.

**Figure 4.4** Broad classification of Kingdom Animalia based on common fundamental features



| Phylum | Level of Organisation | Symmetry | Coelom | Segmentation | Digestive System | Circulatory System | Respiratory System | Distinctive Features |
|---|---|---|---|---|---|---|---|---|
| Porifera | Cellular | Various | Absent | Absent | Absent | Absent | Absent | Body with pores and canals in walls. |
| Coelenterata (Cnidaria) | Tissue | Radial | Absent | Absent | Incomplete | Absent | Absent | Cnidoblasts present. |
| Ctenophora | Tissue | Radial | Absent | Absent | Incomplete | Absent | Absent | Comb plates for locomotion. |
| Platyhelminthes | Organ & Organ-system | Bilateral | Absent | Absent | Incomplete | Absent | Absent | Flat body, suckers. |
| Aschelminthes | Organ-system | Bilateral | Pseudo coelomate | Absent | Complete | Absent | Absent | Often worm-shaped, elongated. |
| Annelida | Organ-system | Bilateral | Coelomate | Present | Complete | Present | Absent | Body segmentation like rings. |
| Arthropoda | Organ-system | Bilateral | Coelomate | Present | Complete | Present | Present | Exoskeleton of cuticle, jointed appendages. |
| Mollusca | Organ-system | Bilateral | Coelomate | Absent | Complete | Present | Present | External skeleton of shell usually present. |
| Echinodermata | Organ-system | Radial | Coelomate | Absent | Complete | Present | Present | Water vascular system, radial symmetry. |
| Hemichordata | Organ-system | Bilateral | Coelomate | Absent | Complete | Present | Present | Worm-like with proboscis, collar and trunk. |
| Chordata | Organ-system | Bilateral | Coelomate | Present | Complete | Present | Present | Notochord, dorsal hollow nerve cord, gill slits with limbs or fins. |

## Characteristics of Vertebrates

## Characteristics of Cyclostomata

- They are jawless vertebrates
  eg: Petromyzon/Myxine

## Characteristics of Pieces

- They are fishes
  eg: Dog fish
- Chambered heart: 2

## Characteristics of Amphibians

- They have mucous glands in skin for respiration
- They have 3 chambered heart

eg: Frogs, toads, amphibians

## Characteristics of Reptiles

- They have 3 chambered heart
- Exception: Crocodile 4 chambered heart
- Cold blooded animals

eg: snake, turtle, lizard, crocodile

## Characteristics of Aves

- They are warm blooded animals
- They have 4 chambered heart
- They lay eggs

## Characteristics of Mammalian

- They are warm blooded organism
- They have 4 chambered heart
- They have mammary glands
- Exception: Mammals but lay eggs eg: Platypus and echidnas

PARMAR
SSC

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Nervous System (Brain)
## तंत्रिका तंत्र (मस्तिष्क)

### Lecture :-4

✓ For Notes Join Telegram :

Click on the icon.

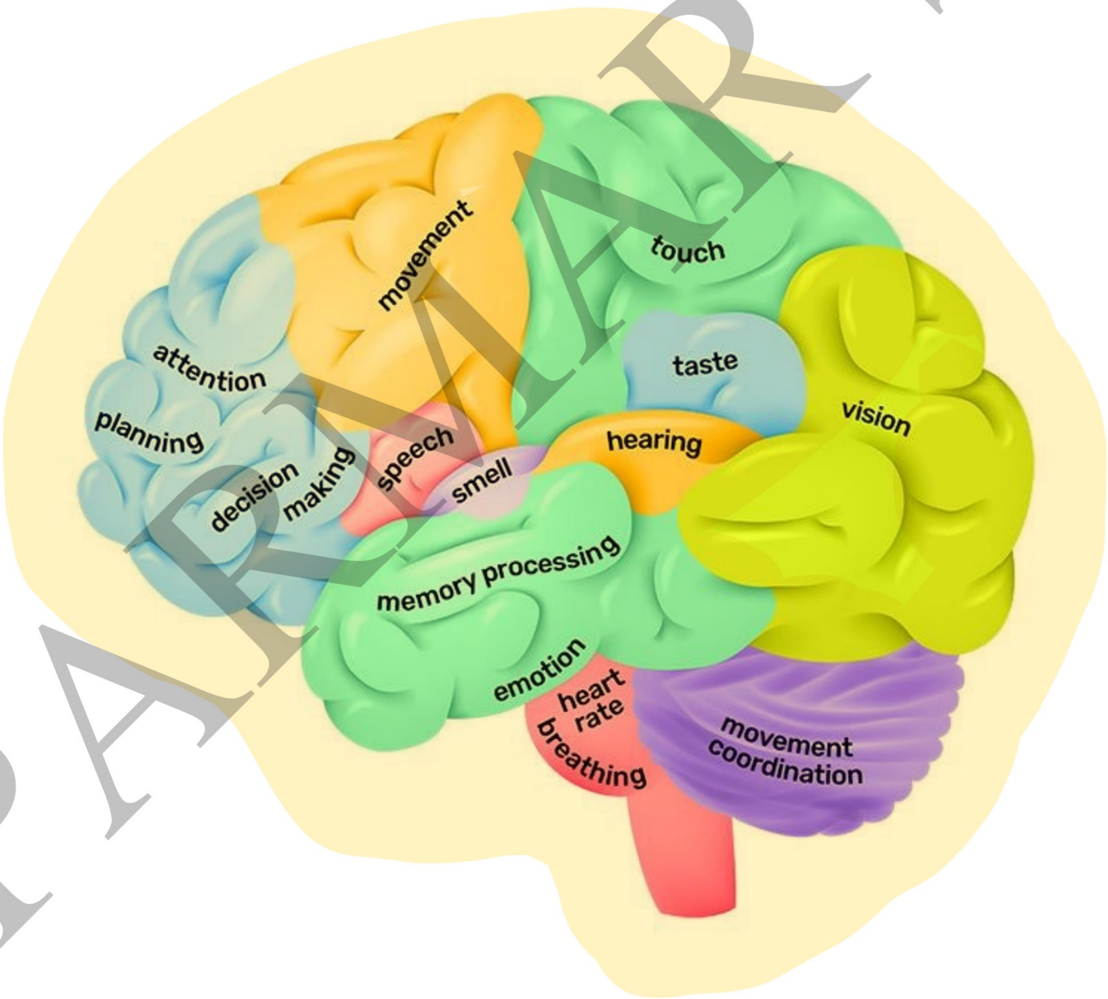
OR
Scan

✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

OR
Scan

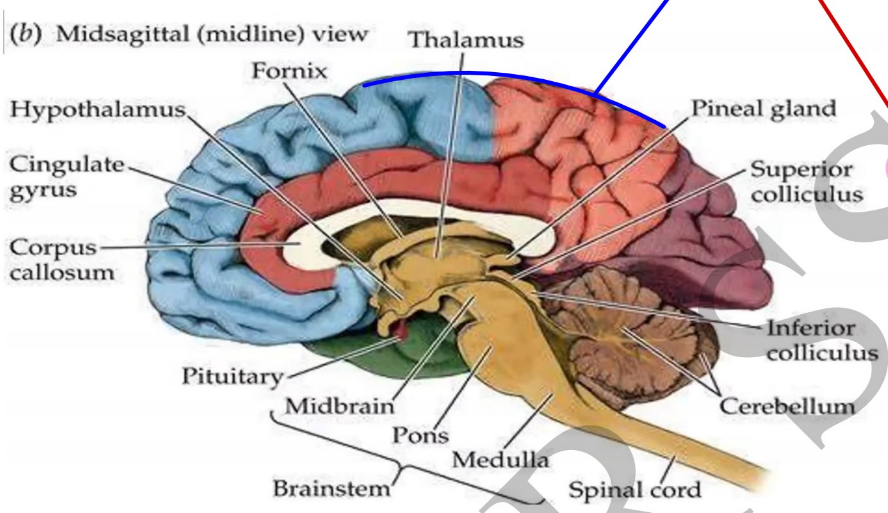
# BRAIN



movement
touch
attention
planning
decision making
speech
smell
taste
hearing
vision
memory processing
emotion
heart rate
breathing
movement coordination

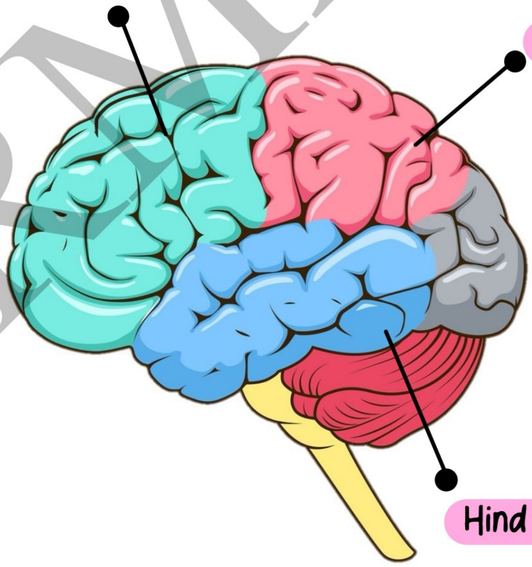
## Control and Coordination

Layer of brain called **"Meninges"** that covers and **protects the brain**


(b) Midsagittal (midline) view
Thalamus
Fornix
Hypothalamus
Cingulate gyrus
Corpus callosum
Pineal gland
Superior colliculus
Inferior colliculus
Cerebellum
Pituitary
Midbrain
Pons
Medulla
Brainstem
Spinal cord

**inflammation** of meninges causes a disease called **"Meningitis"**

## Parts of Brain



**Fore Brain**

major part of brain

**Mid Brain**

**Hind Brain**

smallest portion of brain

- Total no. of bones in brain: 22

**14: cranial**

**8: facial**

## Fore Brain

### Function

- Controls voluntary action
- Associated with hunger, memory, pain

### Parts

- Cerebrum (Memory) —— Associated diseases: Amnesia and Dementia
- Thalamus (Pain and Sensation)
- Hypothalamus (Regulates body temperature and Hunger thrust and Sleet)

Amnesia: loss of memory

Dementia: loss of memory and difficulty in performing day to day function

Alzheimer's Disease

## Mid Brain

### Function

- Controls involuntary actions such as change in pupil size and reflex movements (vision, hearing)

## Hind Brain

### Function

a) Cerebellum

- Controls posture and balance

b) Pons

- Connects Brain and Spinal Cord

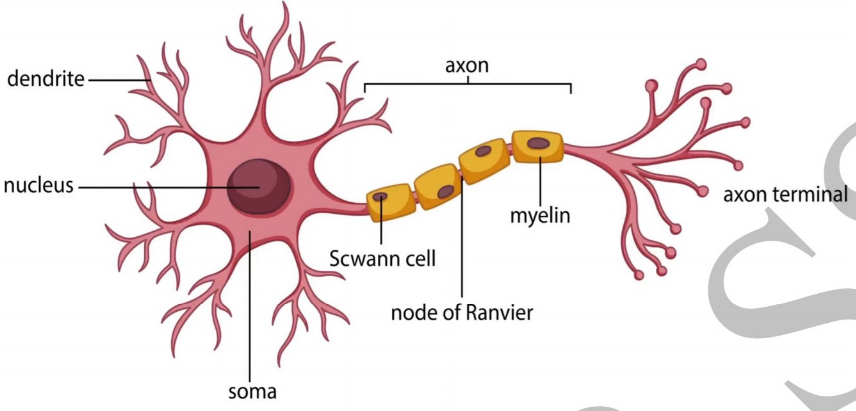
c) Medulla Oblongata

- Controls ANS – Respiration/heartbeat

ANS: Automatic Nervous System

basic unit of nervous system

## Neuron Anatomy


dendrite
nucleus
soma
axon
Scwann cell
myelin
node of Ranvier
axon terminal

## Synapse

- Gap between nerve ending of one neuron's and dendrite of other neuron. Here electrical signal is converted into information which is in the chemical signal

## Hormones

- Hormones discovery: E.H. Starling

Plant Hormones
- Growth related
- Not growth related

Types

### 1) Auxin

- Growth hormone
- It is involved in phototropism (response towards light)

### 2) Gibbrelin

- Growth hormone
- Responsible for germination/flowering

### 3) Cytokinins

- Promote cell division
- Cyto: cell

  Kinin: division

### 4) Abscisic Acid

- It inhibits growth
- It is a stress hormone

### 5) Ethylene — Gaseous hormone

- It helps in fruit ripening

## Hormones in Animals

### Types

### 1) Endocrine Glands

They are ductless glands

They secrete hormones into the blood

eg: adrenal glands, pituitary glands, etc

### Ductless Glands

### a) Thyroxine

- Released by thyroid gland — largest endocrine gland
- Located in neck region
- Due to the deficiency of Iodine, thyroid gland is effected and causes a birth disease known as Goitre

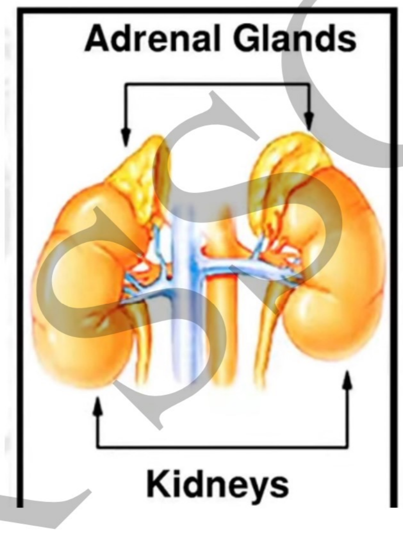
$I^{131}$ used in treatment of goitre

### b) Growth Hormone

- It is secreted by pituitary gland (Master Gland)
- Growth hormone is also known as Somatotropin

### c) Adrenal Gland

- It regulates blood pressure, heart beat
- It located above kidneys
- Also known as "Fight or Flight hormone"



### Insulin

- Secreted by Pancreas —— 2nd largest gland

  cells: β cells of Islet of Langerhans
- It regulates sugar levels (glucose level in the blood)

### Sex Hormones

- In male: Testosterone —— involved in secondary sex characteristics
- In female: Estrogen/Progesterone

  female secondary sex characteristics

  regulating menstrual cycle, pregnancy

### Melatonin

- Regulate sleep
- Released by Pineal Gland —— pea-sized gland
- It is located in brain

## Plant Movement

### Types

### 1) Nastic Movement

- Not growth related

eg: movement in response to touch: Thigmonastic Movement

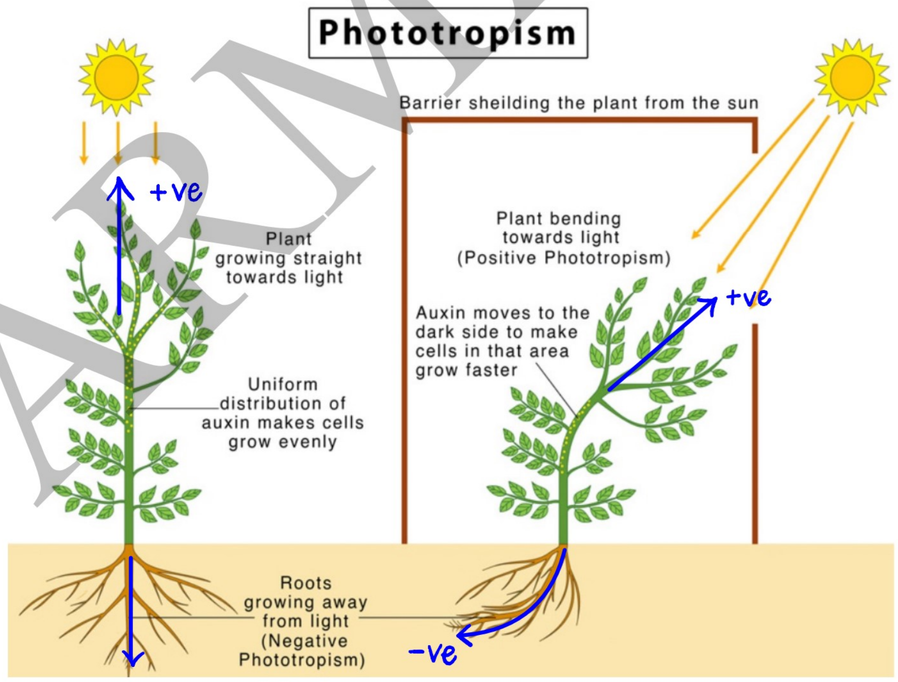
"touch me not" plant

### 2) Tropic Movement

- Growth related

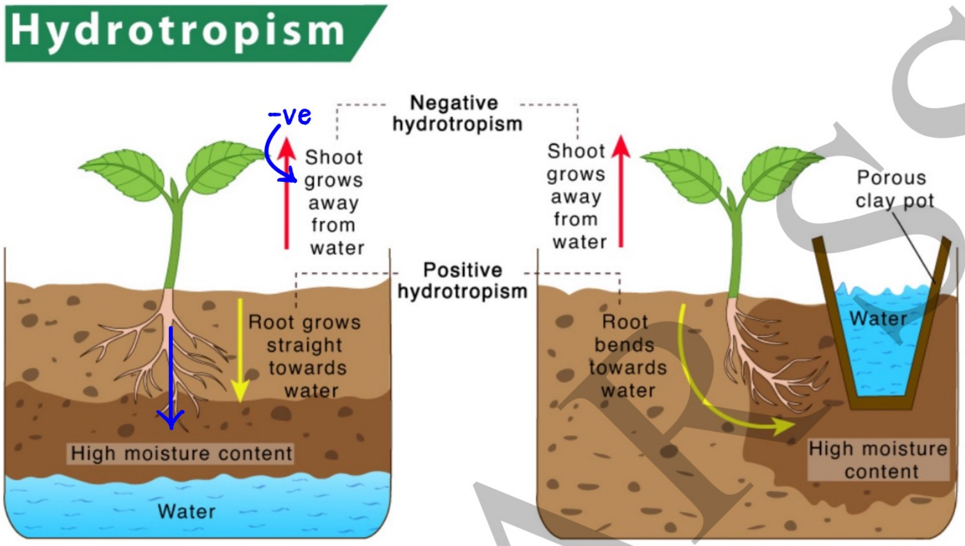
### a) Phototropic movement

- Movement in response to light
- Positive movement: Towards the light source
- Negative movement: Away from the light source


Phototropism
Barrier sheilding the plant from the sun
+ve
Plant growing straight towards light
Uniform distribution of auxin makes cells grow evenly
Plant bending towards light (Positive Phototropism)
+ve
Auxin moves to the dark side to make cells in that area grow faster
Roots growing away from light (Negative Phototropism)
-ve

## b) Hydrotropism Movement

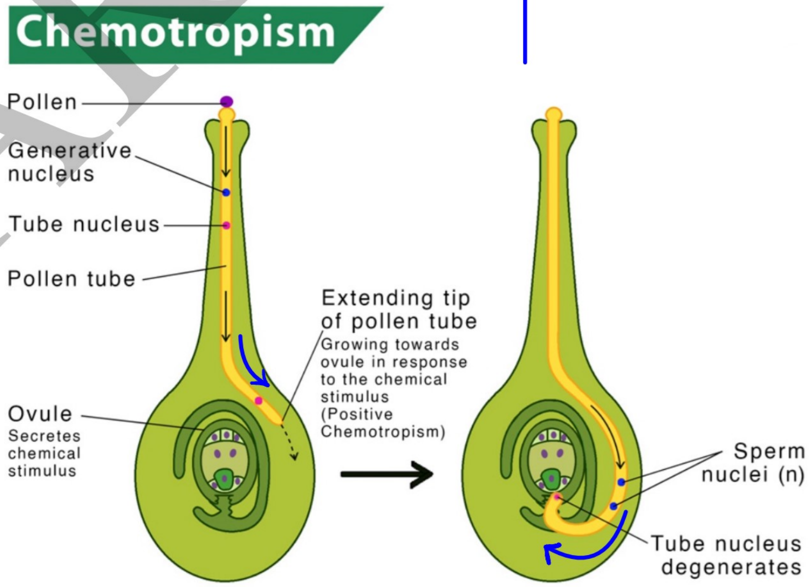
- Movement in response to water


Hydrotropism
-ve
Negative hydrotropism
Shoot grows away from water
Shoot grows away from water
Porous clay pot
Positive hydrotropism
Root grows straight towards water
Root bends towards water
Water
High moisture content
Water
High moisture content

## c) Chemotropism Movement

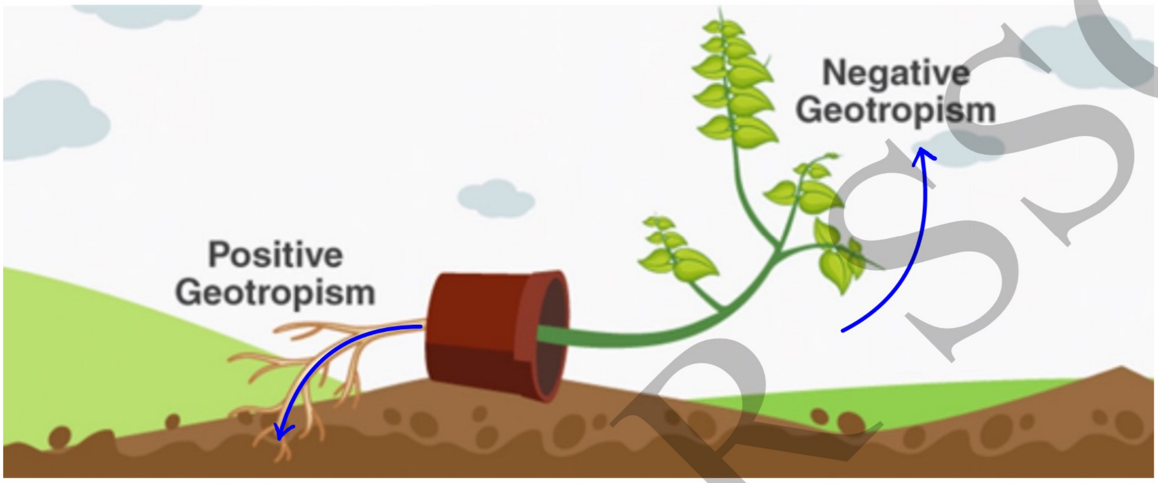
- Movement in response to chemical stimuli

eg: Growth of pollen tube towards the ovule


Chemotropism
Pollen
Generative nucleus
Tube nucleus
Pollen tube
Extending tip of pollen tube
Growing towards ovule in response to the chemical stimulus (Positive Chemotropism)
Ovule
Secretes chemical stimulus
Sperm nuclei (n)
Tube nucleus degenerates

### d) Geotropism Movement

- Movement in response to Gravity


Negative Geotropism
Positive Geotropism

PARMAR
SSC

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Reproductive System (प्रजनन तंत्र)

### Lecture :- 5

✓ For Notes Join Telegram :

Click on the icon.

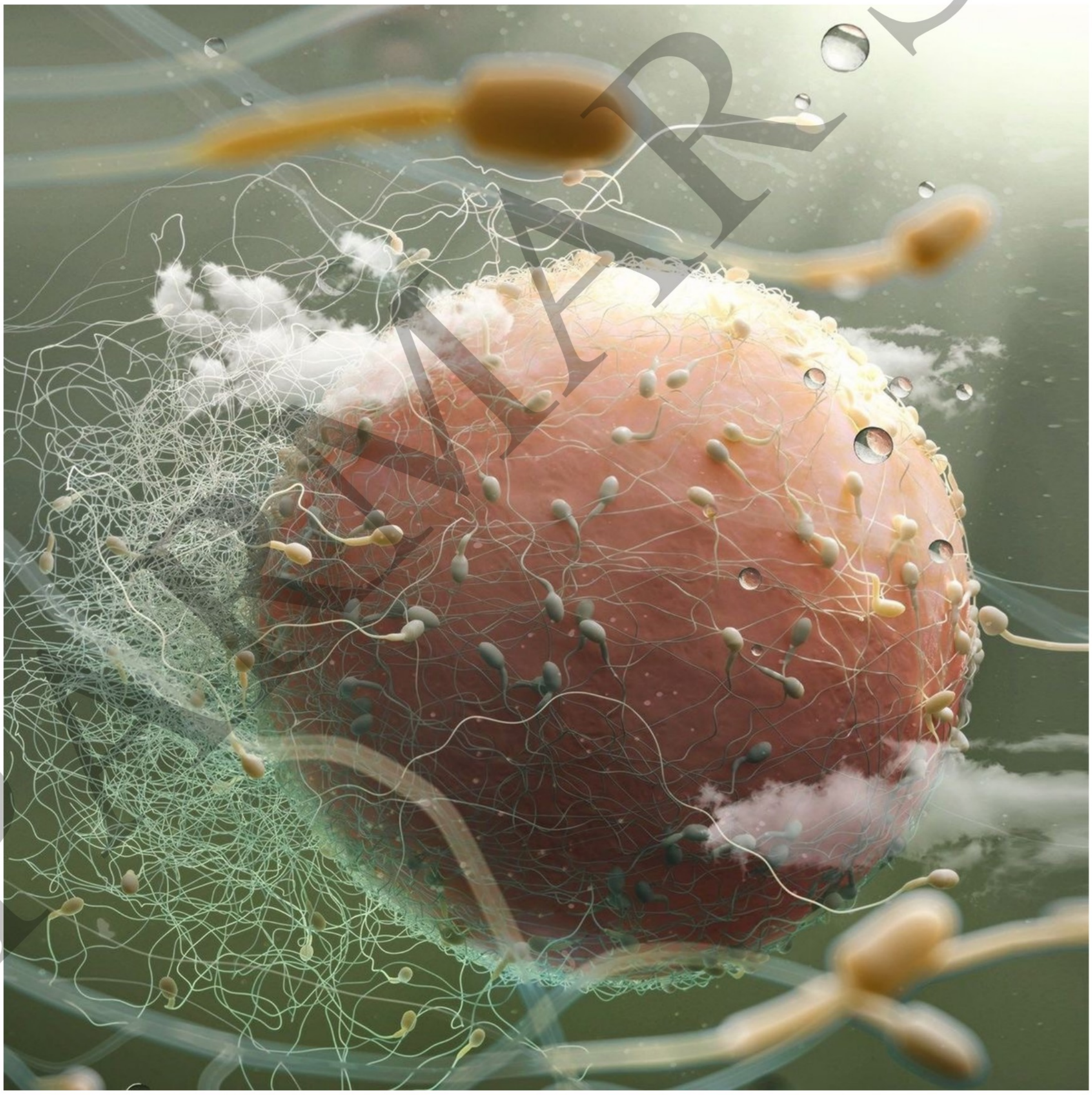
OR
Scan

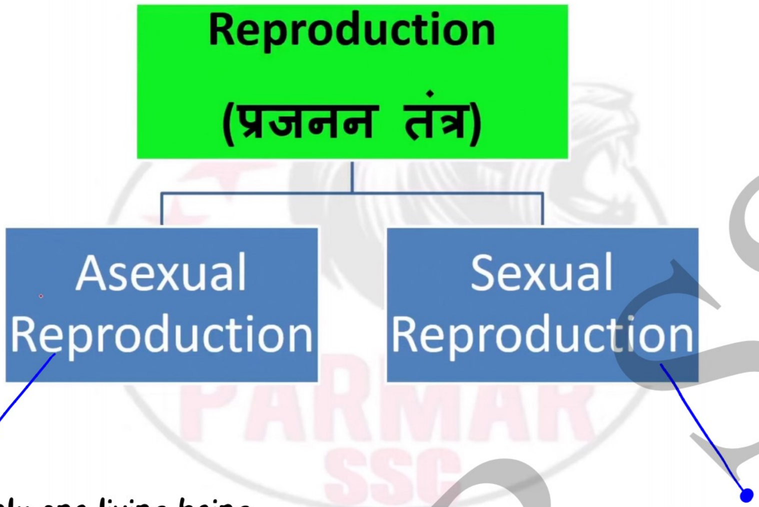
✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

OR
Scan

# REPRODUCTION




Reproduction
(प्रजनन तंत्र)
Asexual Reproduction
Sexual Reproduction

requirement of only one living being

requirement of male and female to produce offspring

## REPRODUCTION

- It is a method by which offsprings are produced by the living beings
- Reproduction is not a necessary instinct for survival of a living being

## ASEXUAL REPRODUCTION

- It involves a single parent
- Occurs in simple organisms like microorganisms, plants

## SEXUAL REPRODUCTION

- It involves two parents
  - Mother
  - Father

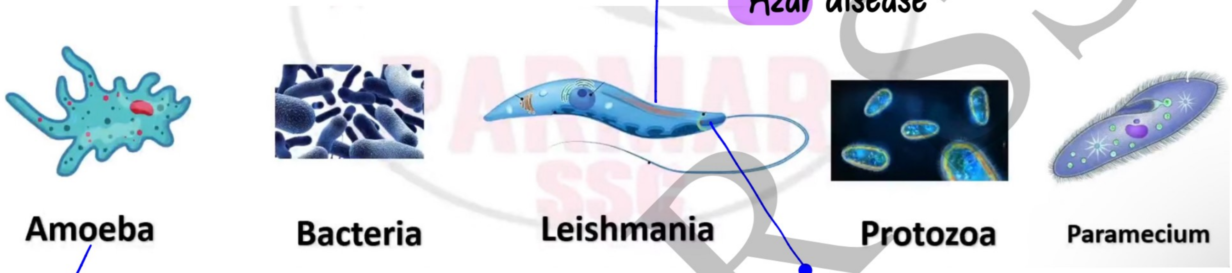
eg: in humans, dogs, elephants, birds, fishes, plants

## TYPES OF ASEXUAL REPRODUCTION

### a) BINARY FISSION

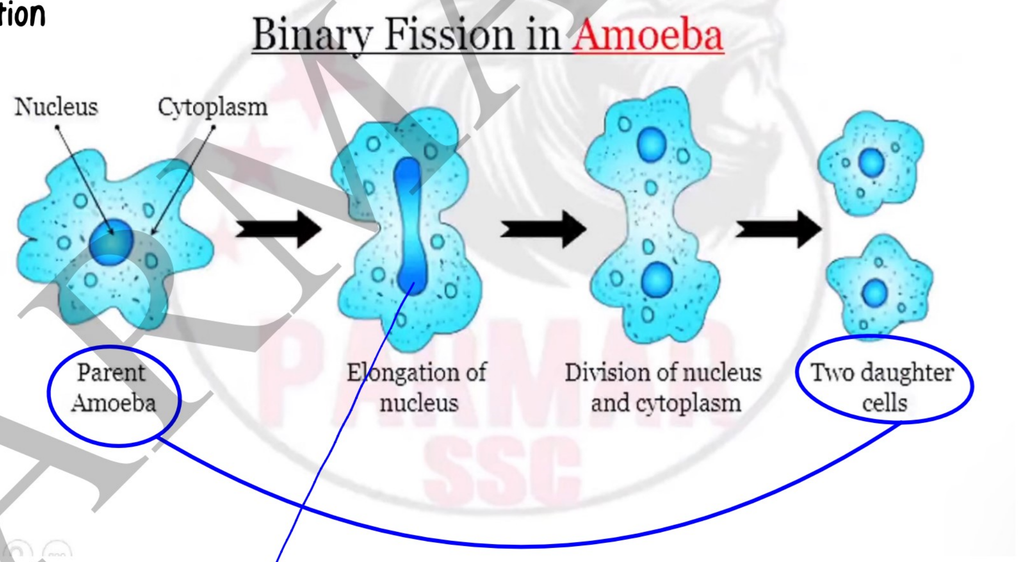
- It is a process of reproduction in which a unicellular organism divides into two organisms
- Only for unicellular organisms

Protozoa that causes Kala Azar disease


Amoeba
Bacteria
Leishmania
Protozoa
Paramecium

reproduction on basis of particular orientation

any orientation


Binary Fission in Amoeba
Nucleus
Cytoplasm
Parent Amoeba
Elongation of nucleus
Division of nucleus and cytoplasm
Two daughter cells

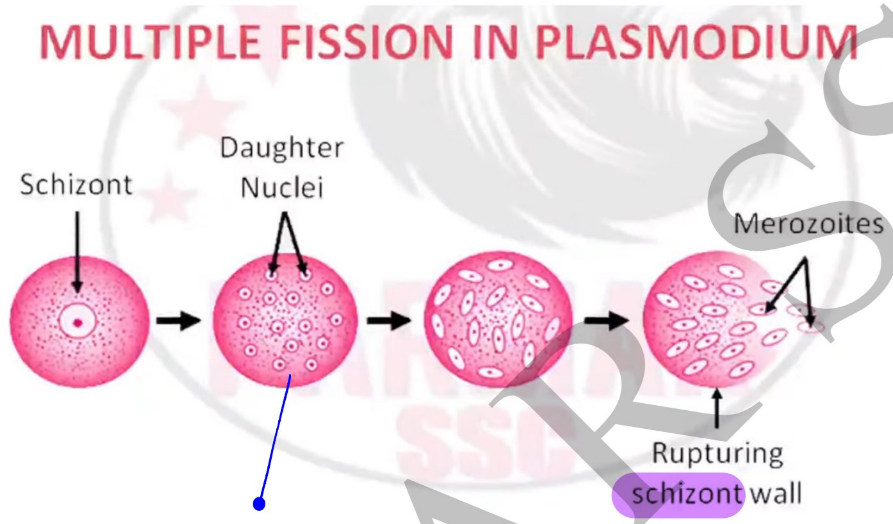
Bi: meaning two

Nucleus inside spreading to divide

### b) MULTIPLE FISSION

- It will develop many offsprings
- It happens in unicellular organisms: Malarial Parasite, Plasmodium

Malaria causing protozoa


MULTIPLE FISSION IN PLASMODIUM
Schizont
Daughter Nuclei
Merozoites
Rupturing schizont wall

Many daughter nuclei develops

### c) FRAGMENTATION

- it is used by simple multicellular organisms like spirogyra and sea anemone

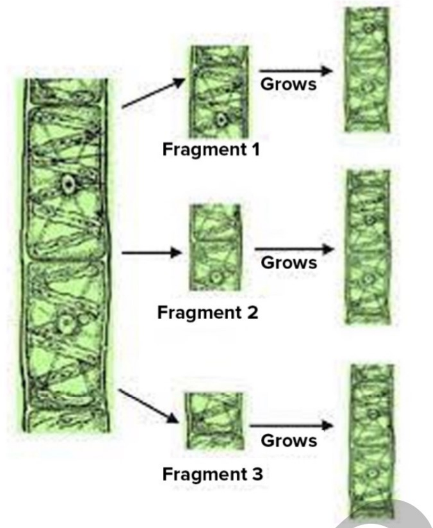
green algae

Spirogyra
Sea Anemone

Plant found in water

Animal found in water

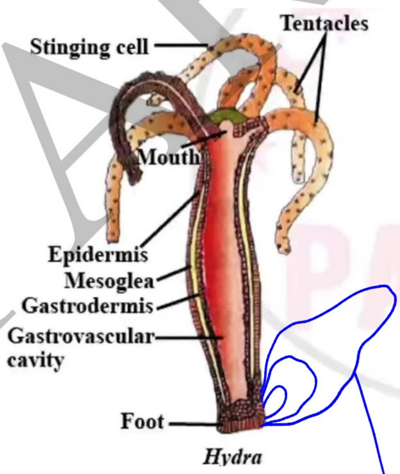
- Red algae mode of reproduction: Fragmentation

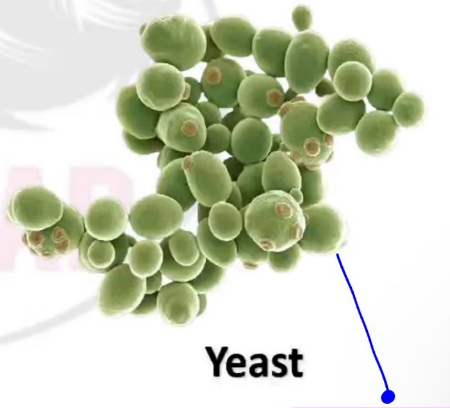

Grows
Fragment 1
Grows
Fragment 2
Grows
Fragment 3

Breaks into half, which is not fully develop that later develops into complete spirogyra

### d) BUDDING

- It is a process used by simple multicellular organisms like hydra and yeast


Tentacles
Stinging cell
Mouth
Epidermis
Mesoglea
Gastrodermis
Gastrovascular cavity
Foot
Hydra



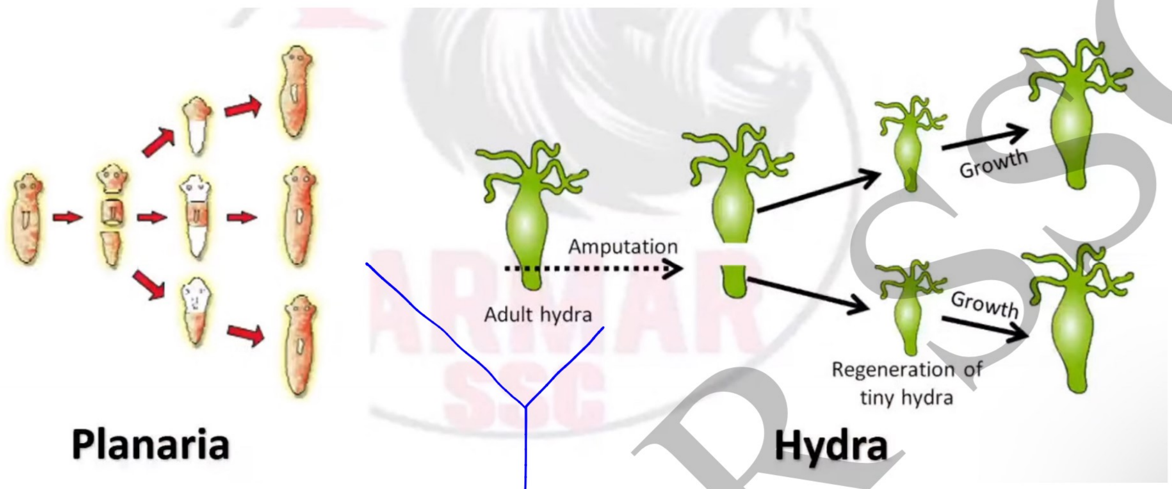
Develops buds to form complete hydra

main method of reproduction in hydra is budding

## e) REGENERATION

not exactly a method of reproduction

- It occurs in simple multicellular organisms like planaria and hydra

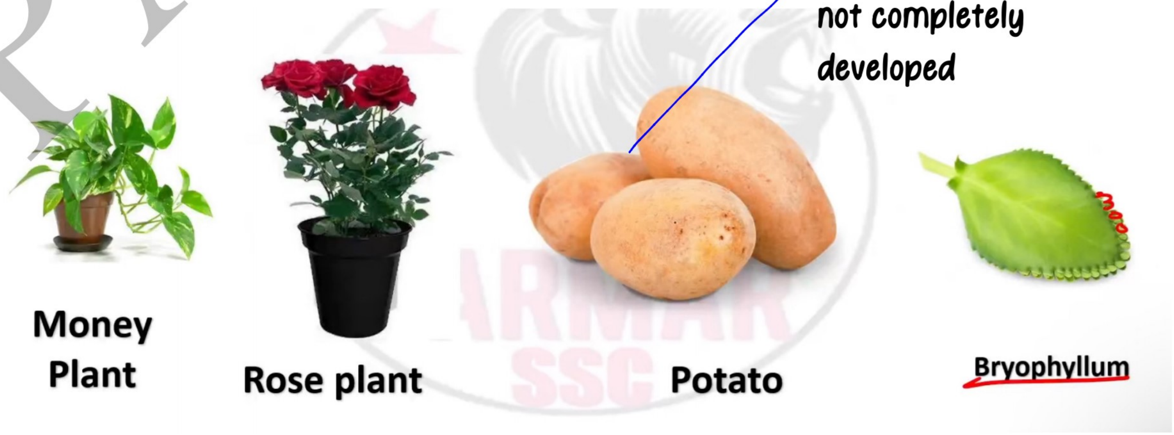

Planaria
Amputation
Adult hydra
Growth
Growth
Regeneration of tiny hydra
Hydra

organisms repairs or regenerates the missing part of the body and forms a complete organism again

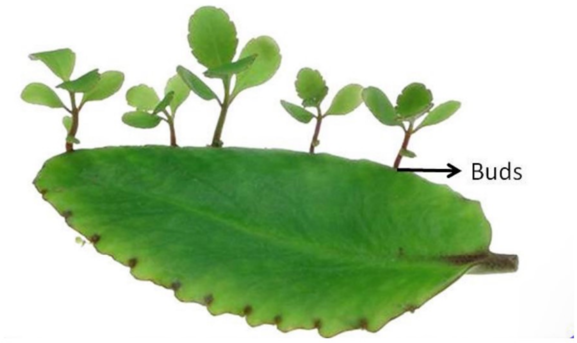
## f) VEGETATIVE PROPAGATION

- It is a type of reproduction where new plants grow from a fragment or cutting of parent plants

Buds develop that is not completely developed


Money Plant
Rose plant
Potato
Bryophyllum

VEGETATIVE PROPAGATION IN BRYOPHYLLUM



→Why is vegetative propagation done?

- To save time
- To get varieties of plants of same
- or different type

eg: in a barren land when it rains, grass grows as stems are present on the ground

TYPES

i) CUTTING: a part of plant (stem or leaf) is cut and planted into soil
eg: rose plant, money plant, sugarcane plant, banana plant

ii) LAYERING: the stem of the plant is bent to the ground and covered with soil
eg: Lemon, strawberry

iii) GRAFTING: cutting from some other plant attached to the stem of a plant and planted to soil
eg: Rose plant

## g) TISSUE CULTURE

- Scientific artificial vegetative propagation is known as tissue culture
- Tissue from different parts of plant are cultured in chemicals in laboratory to develop into a new plant

Ornamental Plants

used in ornamental plants

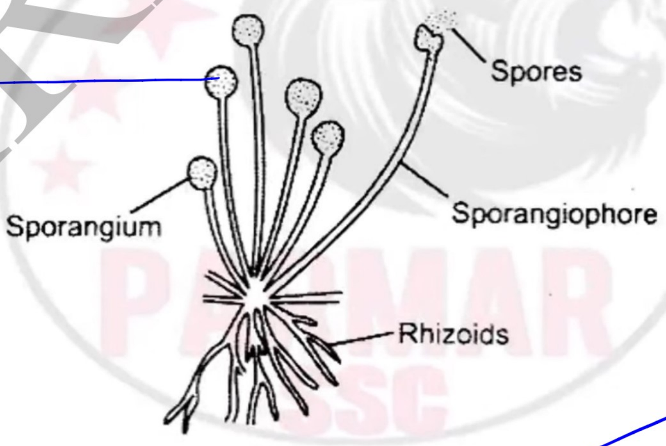
eg: Snake plant

Cost of selling such plant is very high

## h) SPORE FORMATION

- It occurs in simple multicellular organisms like rhizopus

Bob and stick like structures that releases spores and these spores further reproduces to rhizopus



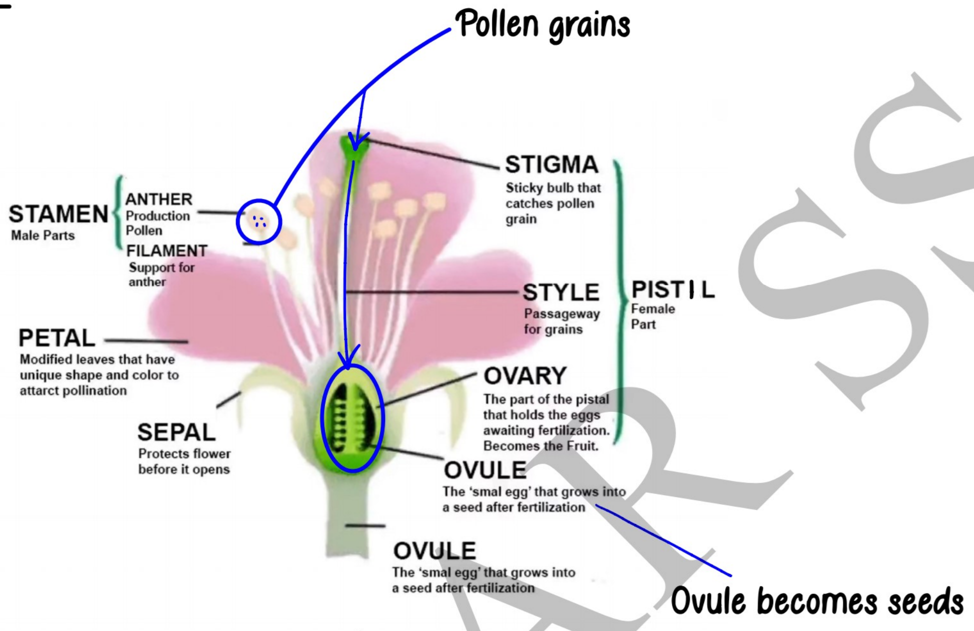
Spore formation in *Rhizopus*

bread mould

- green colour fungus on bread: rhizopus

# SEXUAL REPRODUCTION

## PLANT


Pollen grains
STAMEN
Male Parts
ANTHER
Production Pollen
FILAMENT
Support for anther
PETAL
Modified leaves that have unique shape and color to attarct pollination
SEPAL
Protects flower before it opens
STIGMA
Sticky bulb that catches pollen grain
STYLE
Passageway for grains
PISTIL
Female Part
OVARY
The part of the pistal that holds the eggs awaiting fertilization. Becomes the Fruit.
OVULE
The 'smal egg' that grows into a seed after fertilization
OVULE
The 'smal egg' that grows into a seed after fertilization
Ovule becomes seeds

- Reproductive organ in plants: Flower

### Two types of female

- Male + female part = Bisexual/Monoecious, eg: Hibiscus, sunflower, rose, lily, tulip, tomato, chilli
- Only Male or Female = Unisexual, eg: Papaya, cucumber, watermelon, musk melon, bitter guard

### Male part has:

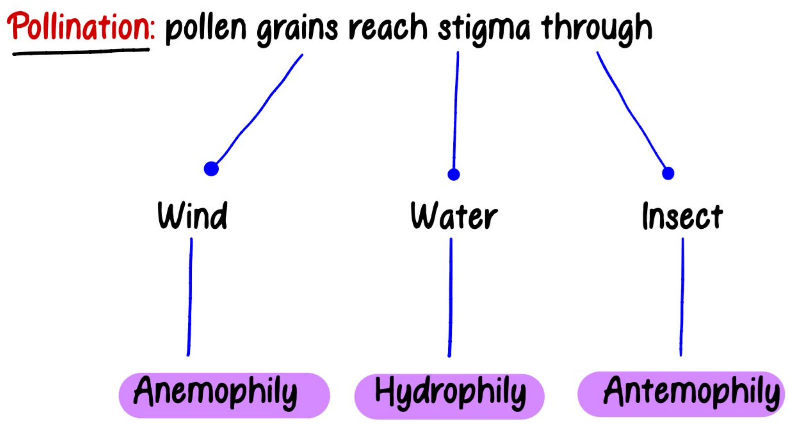
- Filament: supports anther
- Anther: produces pollen

collectively called STAMEN

collectively called PISTIL

### Female part has:

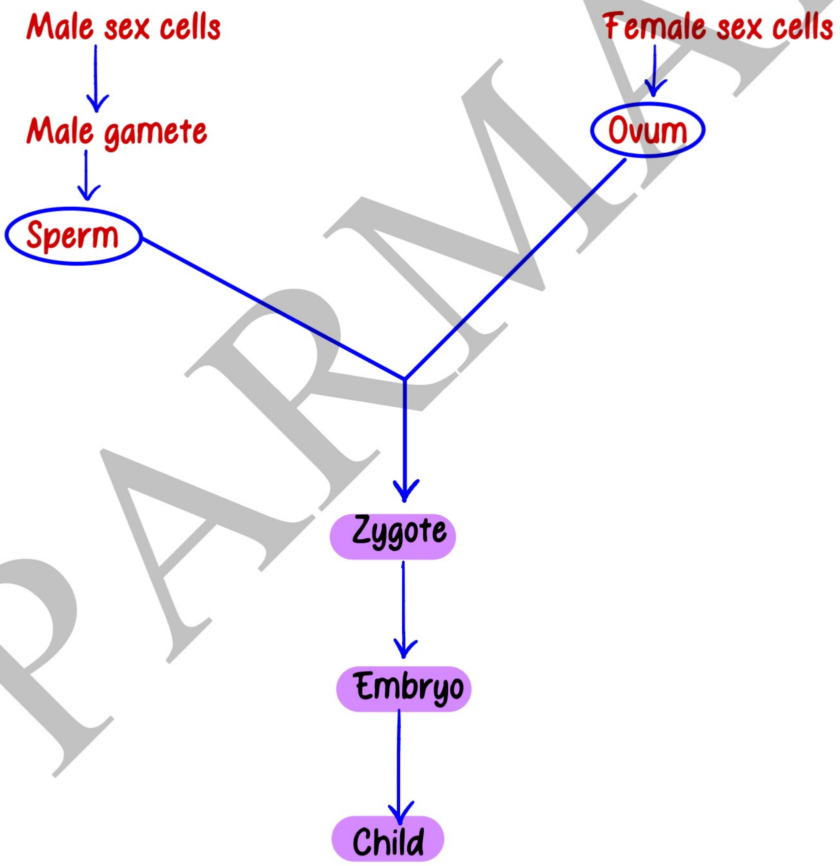
- Stigma: sticky bulb that catches pollen
- Style: passageway for grains
- Ovary: the part of pistil that holds the eggs awaiting fertilisation. Becomes the fruit



**Pollination:** pollen grains reach stigma through

- Wind → Anemophily
- Water → Hydrophily
- Insect → Antemophily

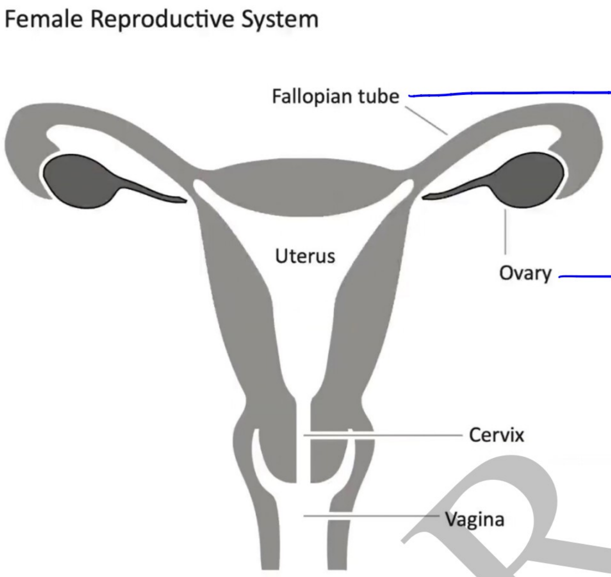
## REPRODUCTION IN HUMANS



Male sex cells → Male gamete → Sperm

Female sex cells → Ovum

Sperm + Ovum → Zygote → Embryo → Child


Female Reproductive System
Fallopian tube
Uterus
Ovary
Cervix
Vagina

site of fertilisation

primary sex organ

- Development of fruit without fertilisation: Parthenocarpy

- Transfer of pollen grains from one anther to stigma of another flower of the same plant is called: Geitonogamy

- Productivity of an ecosystem is composed of: net primary productivity and gross primary productivity

total biomass consumed

energy required to make food - gross primary productivity

- Sequence of parts of female reproductive organ:
- Stigma
- Style
- Ovary
- Thalamus

- One nucleus of the pollen tube and secondary nucleus of the ovum grows into: Endosperm

- Arteries in umbilical cod: Two

- Ability of a single cell to produce a fertile, adult individual: Totipotency

- Cloning: process of creating exact genetic replica of another cell, tissue or organism

- Mutation: change in DNA or gene

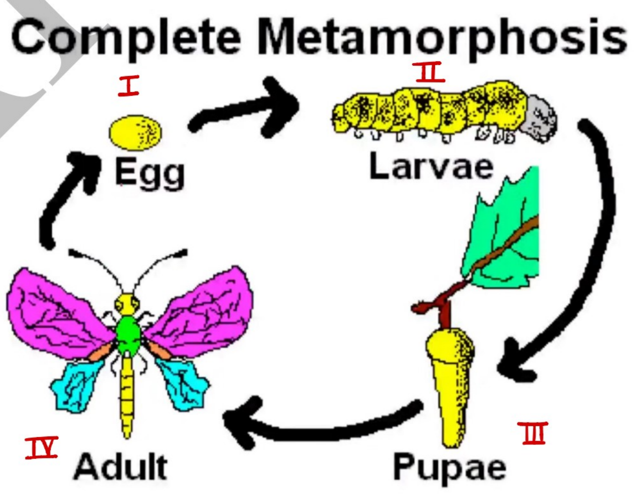
- Female gamete undergoes development to form new organisms without fertilisation in some organism like honey bees, some lizards or birds: Parthenogenesis

- Reproduction in humans is: Internal Fertilisation

- In Vitro fertilisation:joining of women's egg and man's sperm in a laboratory dish (artificial way of fertilisation)

- Metamorphosis: Change in form

Four stages of metamorphosis:



- Oviparous: lay eggs
  eg: Frog

- Viviparous: directly produce offsprings
  eg: humans

## Hereditary and Evolution

- TT: pure tall
- Tt: tall
- tt: short

- First studied by: Gregor Johan Mendel
  ↳ father of genetics
  ↓
  Pea plant (as it shows varieties)
  ↓
  Scientific name: Pisum sativum

## Sex Determination

- Male/Female
- Chromosome: 23 pairs (total: 46)

↙ 1 pair (sex chromosome)

↘ 22 pairs (autosomal chromosomes)

1 pair (sex chromosome) → Male, Female

Male → XY → Y

Female → XX → X

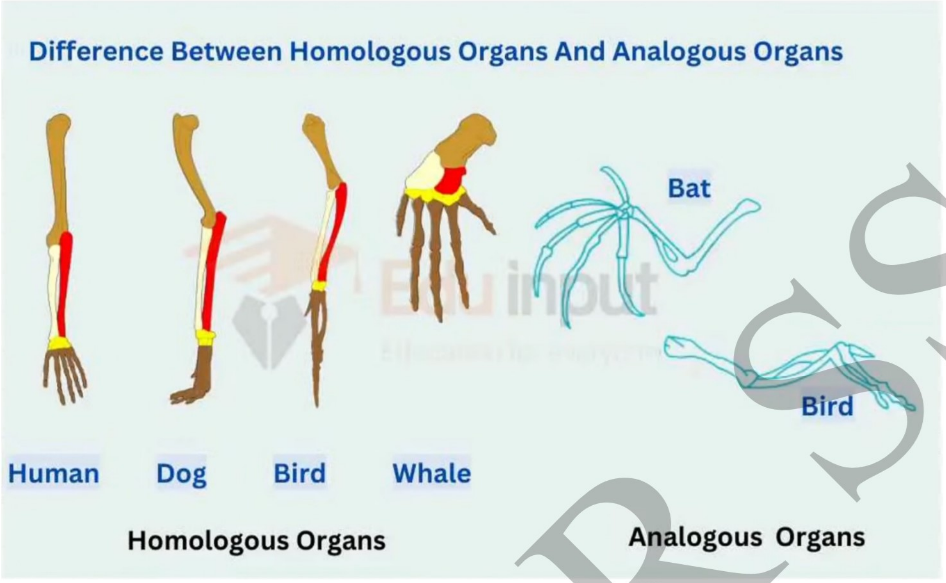
Sperm + Ova = Zygote

Y → Male chromosome determines the sex of a foetus

- Turner syndrome: Female is missing one X chromosome (not a Mendelian disorder)

- Down syndrome: due to extra chromosome (not a Mendelian disorder)

- Homologous organs: look similar but functions are different


Difference Between Homologous Organs And Analogous Organs
Bat
Bird
Human
Dog
Bird
Whale
Homologous Organs
Analogous Organs

- Analogous organs: look different but functions are similar

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Life Processes - 1
### (Digestive & Respiratory System)

### Lecture :- 6

✓ For Notes Join Telegram :

Click on the icon.

OR
Scan

✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

OR
Scan

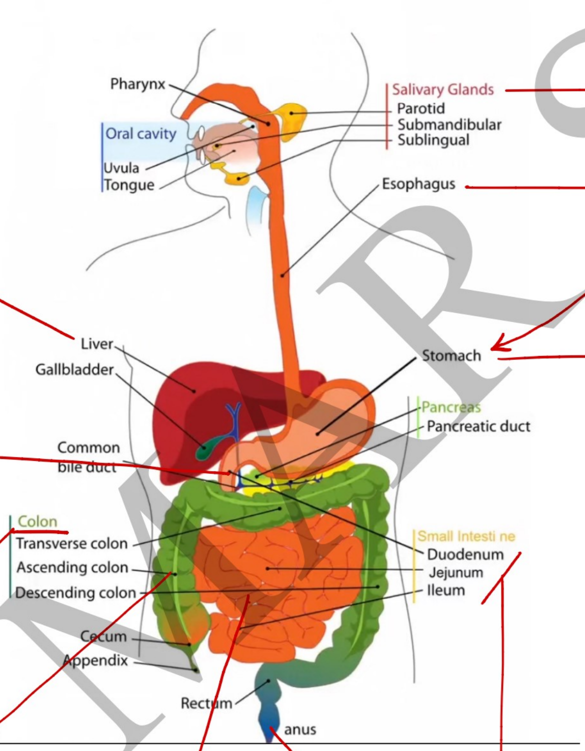
# LIFE PROCESS

## DIGESTION+RESPIRATION

## 4 components of Life Process:

- Digestion
- Respiration
- Circulation
- Excreation

## DIGESTIVE SYSTEM


Pharynx
Oral cavity
Uvula
Tongue
Salivary Glands
Parotid
Submandibular
Sublingual
Esophagus
Liver
Gallbladder
Stomach
Pancreas
Pancreatic duct
Common bile duct
Colon
Transverse colon
Ascending colon
Descending colon
Small Intesti ne
Duodenum
Jejunum
Ileum
Cecum
Appendix
Rectum
anus

releases **bile juice**, it is stored in **gall bladder**

Releases **Salivary Amylase** (enzyme)

Food pipe

food directly goes to stomach

in stomach **HCL** is released

↓

Gastric juice, medium is **Acidic**

**pH value: 1.6**

↓

highly acidic

Sphincter muscles

↓

Allows food to pass to small intestine

Large intestine

Food excreation

small intestine

↓

**finger-like projections: Villi** (provides surface area for food absorption)

jejunum and ileum is inside and duodenum is outside

Longest part of large intestine

→Salivary Amylase: breaks complex carbohydrates to simple carbohydrates

→Pepsin: breaks proteins ⟶Amino Acids

- Needs acidic medium from gastric juice

- Mucus membrane: protects inner delicate lining of stomach from gastric juice

**Small intestine**: 7-8 m length, longest part of alimentary canal
↓
Major part of digestion occur here

**Liver:** largest gland located on right side of abdomen
↓
Dark red colour

**Bile juice** functions (Enzyme secreted by liver)
- **Small intestine: basic/alkanine**
- **Fat globules (large) → Smaller fat globules**

**Pancreatic juice** (secreted by Pancreas)
- amylase: breaks carbs
- lipase: fats → fatty acid
- trypsin: proteins → amino acid
  ↓
  Works in basic medium provides by bile juice

Pancreas — Second largest gland

**Large Intestine**: 1.5 m length
↓
Absorption of water from food

**Maltose:** in salivary gland and small intestine
Maltose → Glucose

Alimentary Canal: the whole passage along which food passes through

↓

Liver and pancreas are not its part

Mouth
↓
Oesophagus
↓
Stomach
↓
Small intestine
↓
Large intestine
↓
Rectum
↓
Anus

- Liver converts glucose into glycogen and amino acids into proteins

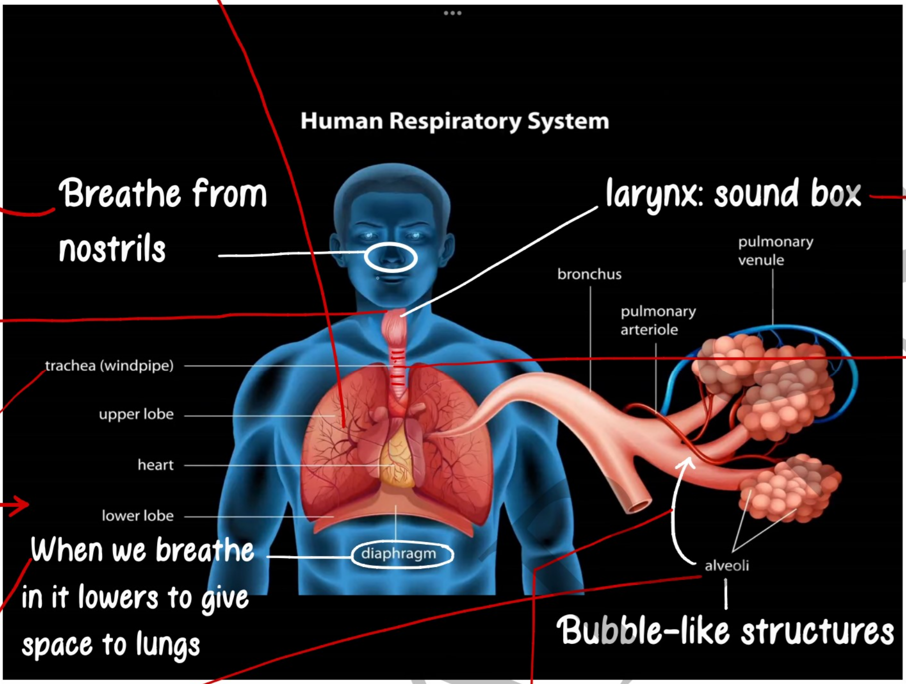
Breathe in: upper

Exhale: down

Lungs surrounded by rib cage (boney structure)

# RESPIRATORY SYSTEM

hairs and mucus purifies the air in nose


Human Respiratory System
bronchus
pulmonary venule
pulmonary arteriole
trachea (windpipe)
upper lobe
heart
lower lobe
diaphragm
alveoli

Breathe from nostrils

larynx: sound box → Adam's apple

Pharynx: where both food and air enters

Trachea → bronchus → Bronchi

rings of cartilage (lines in trachea) → Prevents trachea from collapsing

When we breathe in it lowers to give space to lungs

When we breathe out Lungs shrink and diaphragm(upper) comes to original position → Sheet-like structure

Bubble-like structures

Connected to capillaries

Breathe in

$O_2$ → 21%

$CO_2$ → 0.036%

→ Alveoli supplies this oxygen to blood capillaries → connected to arteries and supplies $O_2$ to every cell → $O_2$ rich blood: oxygenated blood (respiration)

Cells

Breathe out

$CO_2$ → 4.4%

$O_2$ → 16%

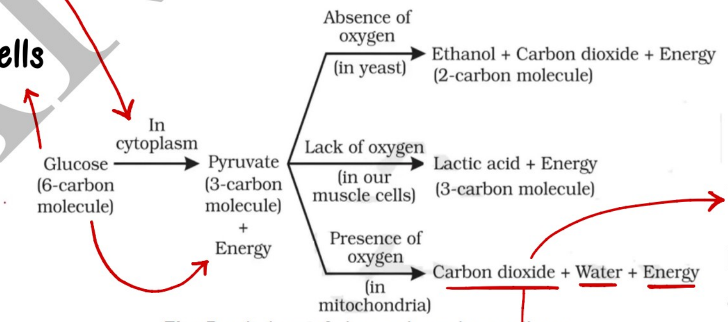

Glucose (6-carbon molecule)
In cytoplasm
Pyruvate (3-carbon molecule) + Energy
Absence of oxygen (in yeast)
Ethanol + Carbon dioxide + Energy (2-carbon molecule)
Lack of oxygen (in our muscle cells)
Lactic acid + Energy (3-carbon molecule)
Presence of oxygen (in mitochondria)
Carbon dioxide + Water + Energy

**Fig:** Break-down of glucose by various pathways

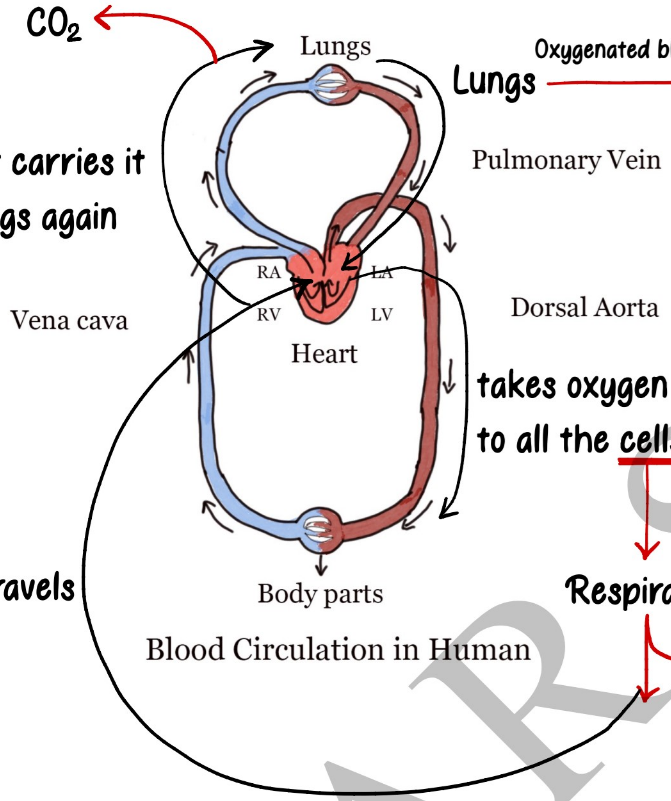
Waste material reaches lungs

Diffusion from high conc. to low conc.

Food stored in form of Glycogen in Liver

Carried by veins (carries deoxygenated blood) → Through exhalation to alveoli

Exhale ← high concentration of $CO_2$ ← alveoli


Lungs
RA
LA
RV
LV
Heart
Pulmonary Vein
Vena cava
Dorsal Aorta
Body parts

Blood Circulation in Human

$CO_2$

Heart carries it to lungs again

Oxygenated blood

Lungs → Heart

takes oxygen ated blood to all the cells

Respiration

CO (deoxygenated blood)

This $CO_2$ travels to heart

- lungs is covered by outer membrane called pleura

Different forms of respiration:

- Anaerobic respiration: in absence of oxygen
  in yeast → Ethanol + CO + Energy
- Aerobic respiration: in presence of oxygen
  in mitochondria → CO + Water + Energy
- Lack of oxygen: oxygen in minute concentration
  in muscle cells → Lactic acid + Energy

Develops cramps in muscle during athletic activities

- Network of air tubes for gas exchange in insects: Trachea
- Present between lungs: Thymus
- Upper part of the respiratory tract with small hair-like structure: Cilia
- Fibre cannot be broken down by the GI tract, does not provide energy but helps the body get rid of wastes and keeps the intestinal tract healthy
- Metabolic reactions are carried out by: Protein

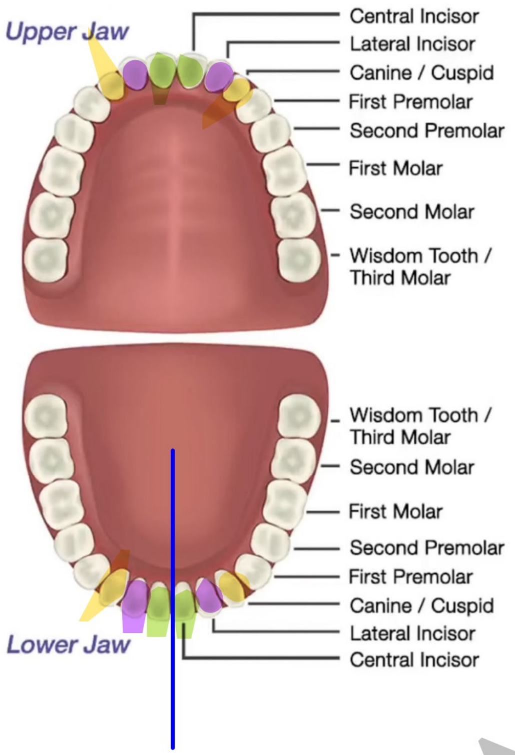
Anabolism: synthesis

Catabolism: break down

- Fluid secreted by new mothers during initial days of lactation, that boosts baby's immune system: Colostrum
- Indigestible portion of our diet: Roughage
- Pouch connected to the junction of small intestine and large intestine: Caecum
- Bariatric surgery brings changes in: Digestive system

Done in obese people

- Organ that can regrow after damage: Liver


Upper Jaw
Central Incisor
Lateral Incisor
Canine / Cuspid
First Premolar
Second Premolar
First Molar
Second Molar
Wisdom Tooth / Third Molar
Wisdom Tooth / Third Molar
Second Molar
First Molar
Second Premolar
First Premolar
Canine / Cuspid
Lateral Incisor
Central Incisor
Lower Jaw

Nose teeth: Incisors

- Central incisor
- Lateral incisor
- Uses: food biting

incisors: 4x2 = 8

= 32

- Canine: 2x2 = 4
- Uses: tearing of food
- Larger in canine animals

- Premolars: 4x2 = 8
- Uses: chewing of food

- Molars: 6x2 = 12
- Uses: grinding of food

- Hardest part of hunman body: Enamel
  (Outer covered of teeth) made of Calcium phosphate

- Inner covering: Dentine

- Strongest part of human body: Jaw

- Wisdom teeth: 3rd molar

- Elephant's outer teeth is known as tusk (incisors)

Bird's beak: extended, modified form of teeth

- Dental formula: $\frac{I\ C\ P\ M}{I\ C\ P\ M}$

$= \frac{2\,1\,2\,3}{2\,1\,2\,3} \rightarrow$ Adults

- In children: Premolar absent
  3rd molar absent

$\frac{2\,1\,0\,2}{2\,1\,0\,2}$

PARMAR SSC

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Life Processes - 2
## (Excretory and Circulatory System)

## Lecture :- 7

✓ For Notes Join Telegram :

Click on the icon.

OR
Scan

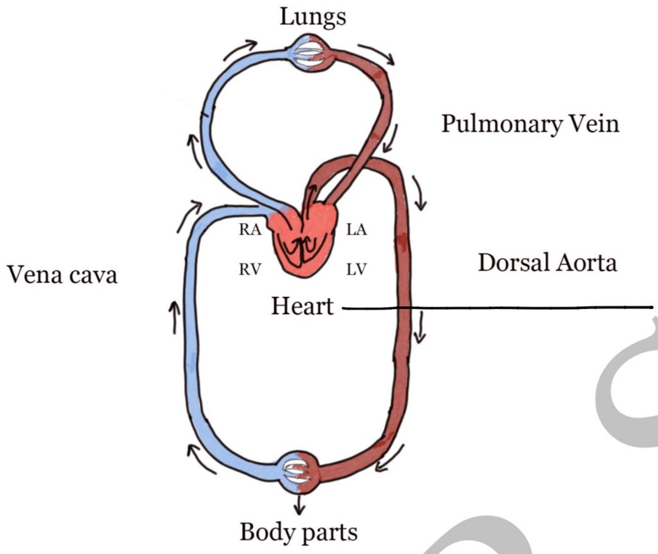
✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

OR
Scan

# CIRCULATION
# AND
# EXCRETION

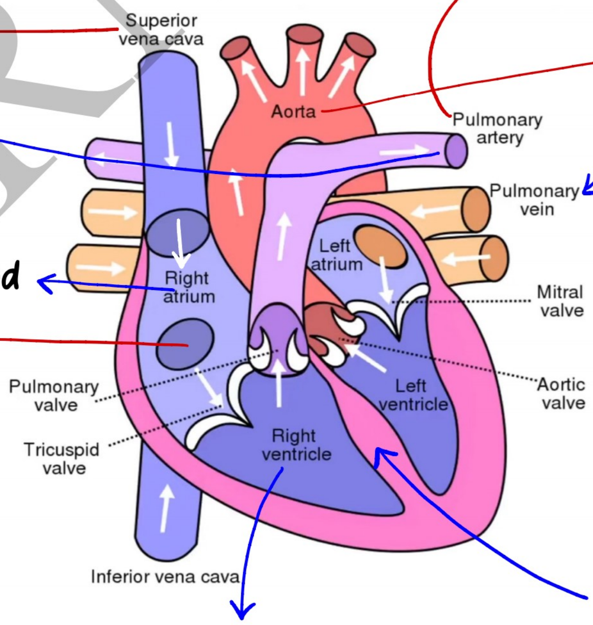
## CIRCULATORY SYSTEM


Lungs
Pulmonary Vein
RA
LA
RV
LV
Vena cava
Dorsal Aorta
Heart
Body parts

Pumping organ: pumps blood to cells

Blood Circulation in Human

- $O_2$ rich blood: bright red
- $CO_2$ rich blood: dark red


Superior vena cava
Aorta
Pulmonary artery
Pulmonary vein
Left atrium
Right atrium
Mitral valve
Aortic valve
Left ventricle
Pulmonary valve
Tricuspid valve
Right ventricle
Inferior vena cava

Lungs

Largest vein

Largest artery

Pulmonary artery (right) — longer

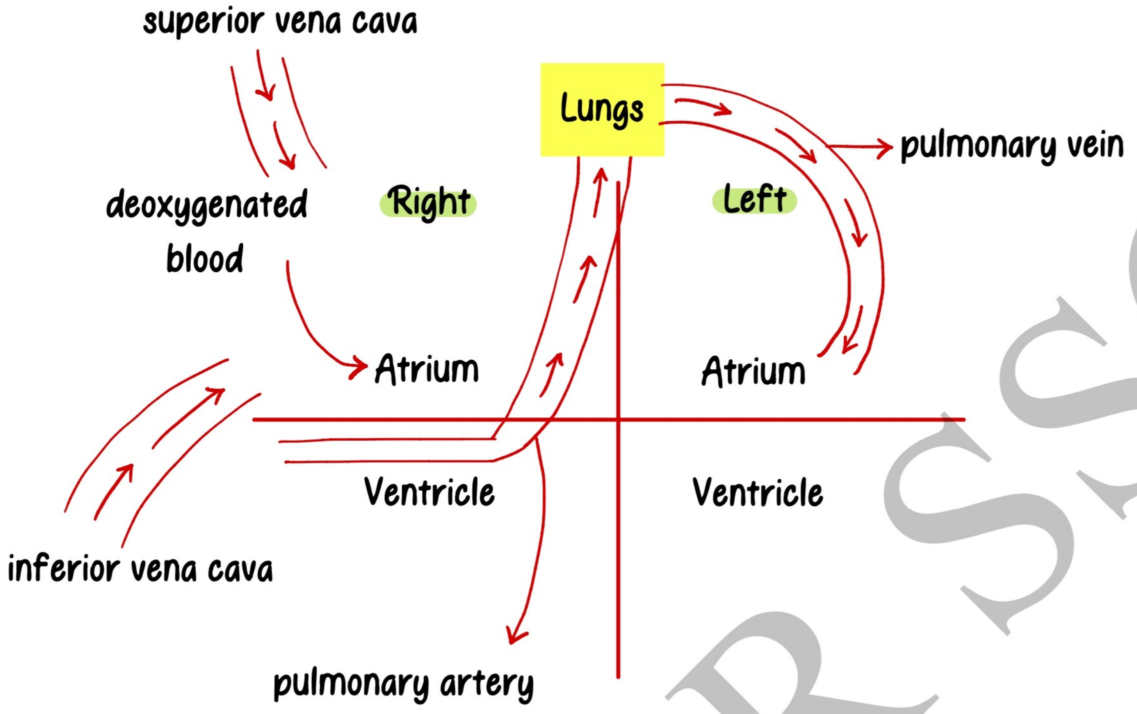
Because of aorta

Collects blood

Sinoatrial node
↓
initiates heartbeat

Pumps blood

Septum (dividing wall between left and right part of heart)


superior vena cava
Lungs
pulmonary vein
deoxygenated blood
Right
Left
Atrium
Atrium
Ventricle
Ventricle
inferior vena cava
pulmonary artery

Heart to different body parts (pure blood)

Narrow, thicker (due to pressure)

**Arteries**: carries oxygenated blood
**Veins**: carries deoxygenated blood
**Pulmonary artery**: carries deoxygenated blood (right ventricle to lungs)
**Pulmonary vein**: carries oxygenated blood (lungs to left atrium)

different body parts to heart (impure blood)

**Exception**

- When heart contracts: systole 120 mm of Hg (if more than this, then high BP)
- When heart relaxes: diastole 80 mm of Hg (if less than this, then low BP)
- Sound oh heart: lubb-dubb (when heart contracts)

## Blood Group

**Discovery:** Karl Landsteiner
**Universal donor:** O-
**Universal acceptor:** AB+

valves of heart:
- Mitral
- Aortic
- Tricuspid

→ by YM Bhendel
**Bombay blood 1952, Bombay):** Lacks H antigen on RBCs, have anti-H in the serum i.e. **cannot take blood from anyone**

Systole: Contractions

Diastole: Relaxation

Given B+ blood
A+ ← B+
↓
can die due to blood coagulation

- **Pacemaker: Artificial heart**

- Rh factor is a protein on the surface of RBCs
- Rh+ - Protein present
- Rh- - Protein not present

# EXCRETORY SYSTEM

Waste removal → Solid eg: by kidneys

↓ Gaseous eg: by lungs

↓ Liquid eg: by skin (sweating)

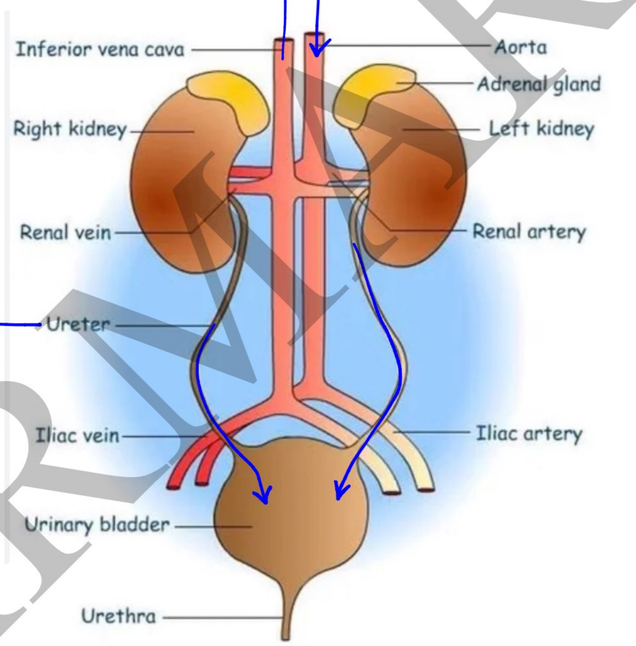
- Basic unit of kidney: Nephron (specialised cells)
- Millions of nephron present in one kidney

Deoxygenated blood

↑

Kidney to heart — Renal vein

Heart


Inferior vena cava
Aorta
Adrenal gland
Right kidney
Left kidney
Renal vein
Renal artery
Ureter
Iliac vein
Iliac artery
Urinary bladder
Urethra

2 ureters, sends wastes to urinary blood

* Right kidney is slightly down than left kidney

C M P

↓ ↓ ↓

Cortex Medulla Pelvis

- Yellow solid waste from anus due to bilirubin

Waste product: Ammonia

↓ Kidney converts ammonia to

Urine → Ureter → Urinary bladder

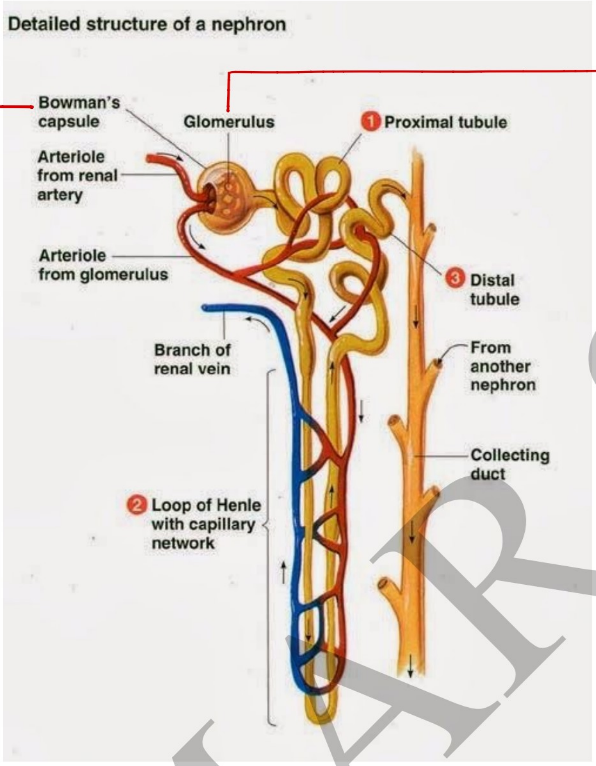
↓

Colour: yellow due to Urobilin/Urochrome

- Urea is major excretory product

Reabsorption and removal of nutrients/urea

Nephron: removes


Detailed structure of a nephron
Bowman's capsule
Glomerulus
① Proximal tubule
Arteriole from renal artery
Arteriole from glomerulus
③ Distal tubule
Branch of renal vein
From another nephron
Collecting duct
② Loop of Henle with capillary network

Ultrafiltration (filters everything)

Urine component:
- Water: 95%
- Urea: 2%
- pH: 4.8

- liver cells are made of kupffer cells

Kidney stone made of: Calcium oxalate

When both kidney malfunctions: Dialysis is done

Artificial process to remove the waste from blood

- Large bean-shaped lymphoid organ in human body: Spleen (lymphoid organ)
- Swollen bluish veins resulting from valves that do not close properly: Varicose veins
- A healthy individual has 12-16 gm of haemoglobin in in every 100 mL of blood
- Heart weight: 285 gm
- RBCs develop in bone marrow
- Brain weight: 1300-1400 gm, male brain weighs more than females
- Blood clot (coagulation) is formed because of presence of platelets
- Carbon Monoxide reduces oxygen carrying capacity of blood
- Sweating/perspiration is a nature's way of releasing excess water from the body
- Flame cells: kidney, found in aquatic vertebrates

PARMAR
SSC

# SSC GK

# PARMAR'S GK BATCH

## Biology

## DISEASES (रोग)

### Lecture :- 8

✓ For Notes Join Telegram :

Click on the icon.

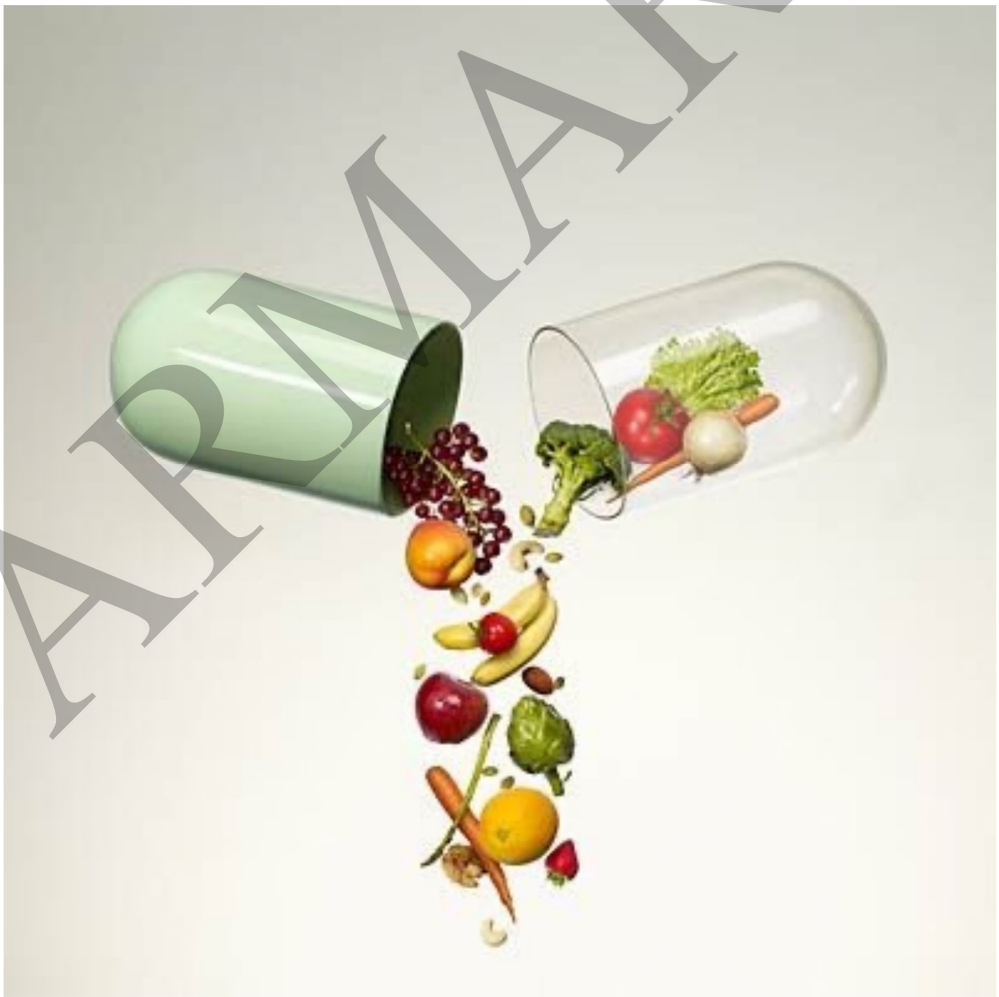
OR
Scan

✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

OR
Scan

# DISEASES AND DEFICIENCY



## Classification of diseases on the basis of time

Acute disease: diseases that last for a short period of time
eg: fever, cold, cough

Chronic diseases: diseases that last for a long period of time
eg: Diabetes, TB, elephantiasis (filaria)

## COMMUNICABLE AND NON-COMMUNICABLE DISEASES

Communicable diseases: diseases that spread from one person to another (infectious diseases)
eg: AIDS, cold, chicken pox, COVID

Non-Communicable diseases: diseases that cannot spread from contact (non-infectious)
eg: diabetes, arthritis, glaucoma, polio

## DISEASES CAUSED BY VIRUS

- Virus has a genetic material → DNA
  → RNA: Retrovirus eg: COVID virus
- Behaves as a non-living entity outside
- Requires a host to replicate (becomes living entity later)

## VIRUS DISEASES TRICK

Dr. → dengue
M → measles
I → influenza
S → swine flu → H1N1
H → hepatitis
R → rabies
A → AIDS

B → bird flu → H5N1
E → encinitis
S → small pox → eradicated in 1979, last case in Somalia (Africa)
T
M → mums
P → polio → Poliomyelitis virus → Entovirus

## Diseases caused by virus

### DENGUE

- **carrier:** female Aedes aegypti mosquito

### AIDS (Acquired Immunodeficiency Syndrome

- sexually-transmitted diseases
- **virus:** HIV → Human Immunodeficiency Virus (retrovirus)
- **death:** due to weak immune system
- **method of transmission:** sexual contact, blood transfusions, from mother to baby
- **test:** ELISA Test (Enzyme-linked Immunosorbent Assay)
- **AIDS DAY:** 1st Dec

## Diseases caused by bacteria

### TRICK

T → tetanus
Wo → whooping cough
Go → gonorrhoea
L → leprosy
P → pneumonia → Streptococcus
T → typhoid → Widal Test
A → anthrax
T → typhoid → Salmonella typhi, Clostridium tetani
CH → cholera → Vibrio cholera
P → plague
S → syphilis

- Acne caused due to: Staphylococcus bacteria

## Diseases caused by fungi

B → Baldness

A → Athlete's foot

R → Ring worm

S → Scabies

A → Asthma

## Diseases caused by Protozoan

### Malaria → 25th April

- **Protozoa:** plasmodium
- **Carrier:** female Anopheles mosquito
- **Treatment:** Quinine (found in bark of cinchona tree)

### Sleeping Sickness

- **Protozoa:** Trypanosoma
- **Carrier:** Tse Tse flies

### Kala Azar

- **Protozoa:** Leishmania
- **Carrier:** Sandfly

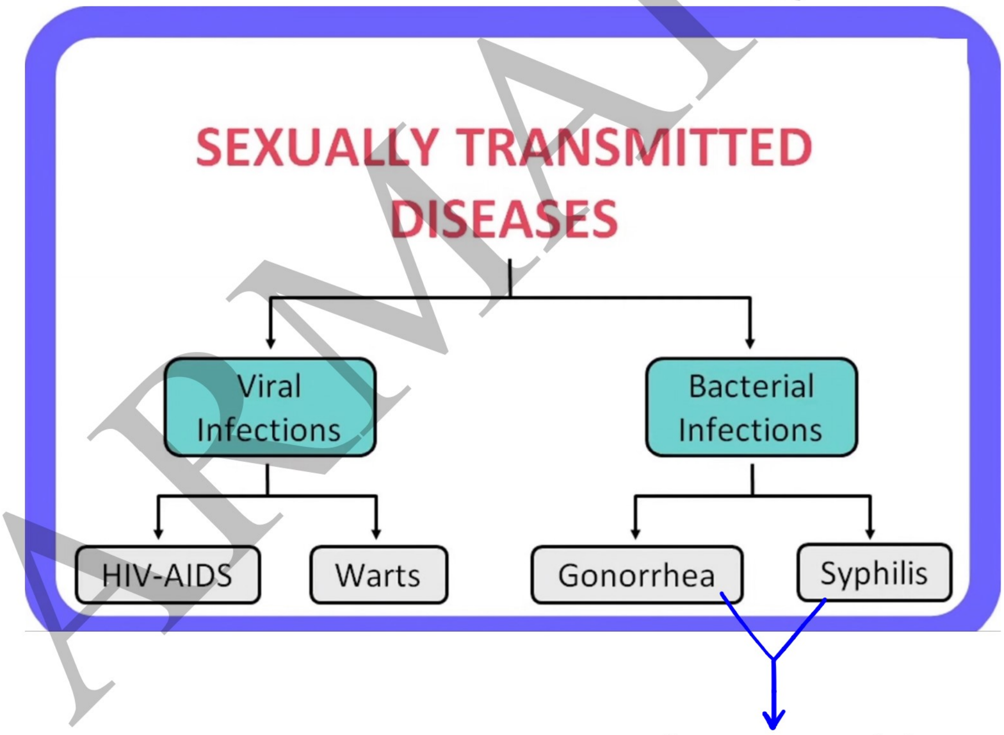
## GENETIC DISORDERS

Genetic disorders are caused due to gene malfunction (meiosis)

- Down Syndrome
- Thalassemia
- Sickle Cell Anaemia
- Colour blindness
- Turner's Syndrome: X-chromosome is missing, seen only in female
- Albinism
- Angelman Syndrome

### MENDELIAN DISORDERS

Change in gene (gene defects)


SEXUALLY TRANSMITTED DISEASES
Viral Infections
Bacterial Infections
HIV-AIDS
Warts
Gonorrhea
Syphilis

sexually transmitted diseases

### Spread of diseases

- Air: TB, Pneumonia, common cold
- Water: Cholera, Diarrhoea, Amoebic dysentery

- TB spread through droplet infection (affects lungs)

- Visible sign of severe Iodine deficiency: Swelling in neck (goitre), if thyroid gland doesn't promote Thyroxine hormone

- Antibiotics do not work against viral diseases but only against bacterial diseases (disrupts cell wall formation)

- Beri beri cannot be prevented by vaccination

- According to WHO, "Hygiene refers to conditions, health, and prevent spread of disease"

- Plant diseases
- Citrus cranker: bacteria
- Rust of disease: fungus
- Yellow vein mosaic: virus
- Aster Yellow: bacteria
- Crown Gall: bacteria
- Ergot: fungus
- Snow mild: fungus
- Black know: fungus
- Blight: fungus/bacteria

- Disease caused by drinking contaminated water: Cholera

- Epilepsy: disorder resulting in abnormal electrical discharge from brain cells causing seizures

- Jaundice: skin and eyes turn yellow due to deposit of bile pigments

- Pernicious anaemia: due to B12 deficiency

- Varicella Zoster virus: Chicken pox

- Wilson disease: excessive amount of deposition of Cu
- Night blindness: due to Vitamin A
- Nyctophobia: fear of darkness
- Diabetes mellitus: Glucose level is high
- Monkey bite: disease caused is Rabies
- Soft bone disease: Osteomalacia
- Osteoporosis: when bones become fragile, due to deficiency of Vitamin D
- Osteomyelitis: inflammation in bone
- Mad Hatter Disease: due to Mercury poisoning

  ↓ also responsible for Minimata disease

- Inhaling iron dust causes Siderosis disease
- Itai Itai: caused due to Cadium deposition
- Blue baby syndrome: caused due to Nitrate deposition
- Rickets: affects bones
- Dementia, diarrhoea, dermatitis: three D'Souza caused in Pellagra

- Helicobacter pylori: responsible for peptic ulcers
- Escherichia coli: causes diarrhoea
- Mode of tranmission of disease "Yellow vein mosaic of bhindi": insect
- Bacille Calmette-Guerin vaccine (BCG): Tuberculosis
- X-linked recessive disorder: Haemophilia A
- Evil influence of stars: Influenza
- Plague is caused by bacteria: Yersinia pestis
- Flavivirus: genetic material is RNA

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Nutrition in Plants and Animals

### Lecture :- 9

✓ For Notes Join Telegram :

Click on the icon.

OR
Scan

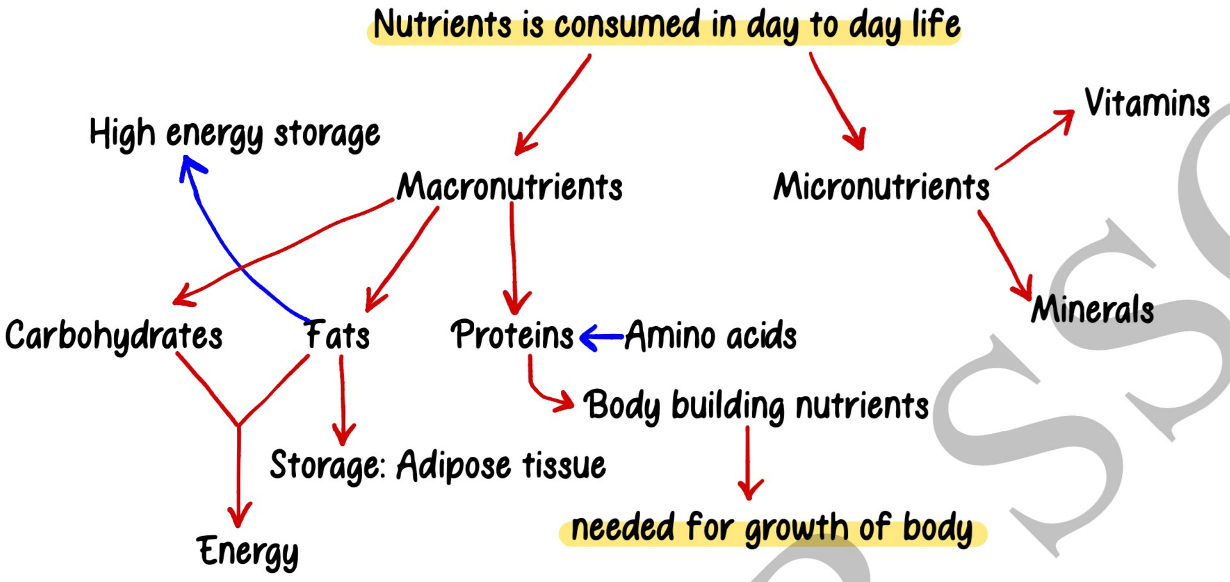
✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

OR
Scan

# NUTRITION IN PLANTS AND ANIMALS

## NUTRIENTS IN ANIMALS



Nutrients is consumed in day to day life

Macronutrients

Micronutrients

Vitamins

Minerals

High energy storage

Carbohydrates

Fats

Proteins

Amino acids

Body building nutrients

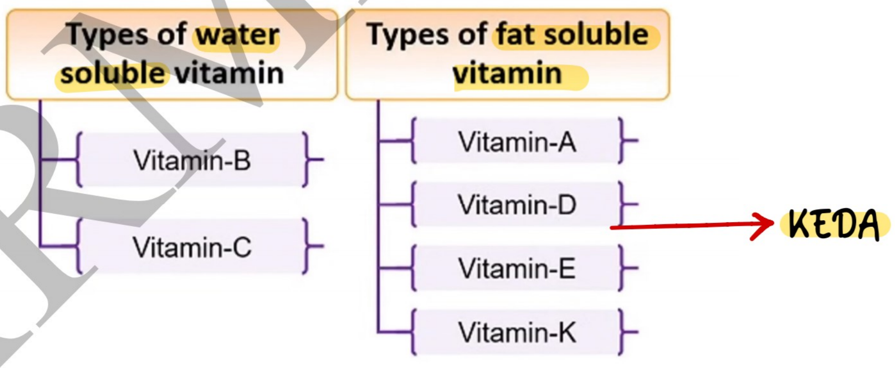
Storage: Adipose tissue

needed for growth of body

Energy

- 1912: Casimir Funk, coined the term "VITAMIN"

On the basis of solubility:



**Types of water soluble vitamin**

Vitamin-B

Vitamin-C

**Types of fat soluble vitamin**

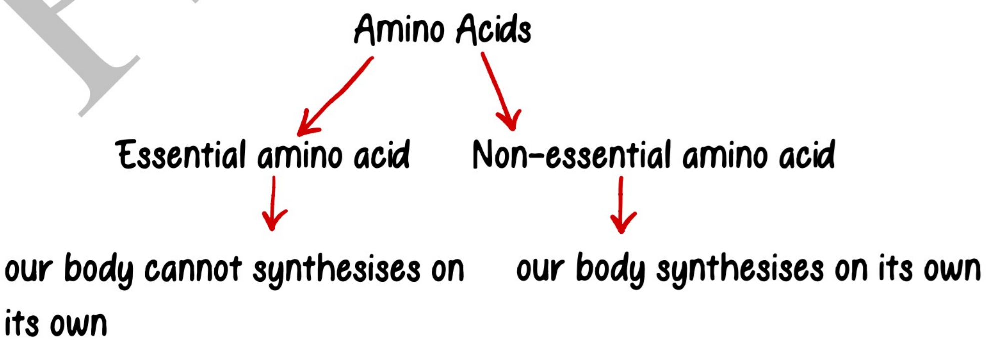
Vitamin-A

Vitamin-D

Vitamin-E

Vitamin-K

KEDA



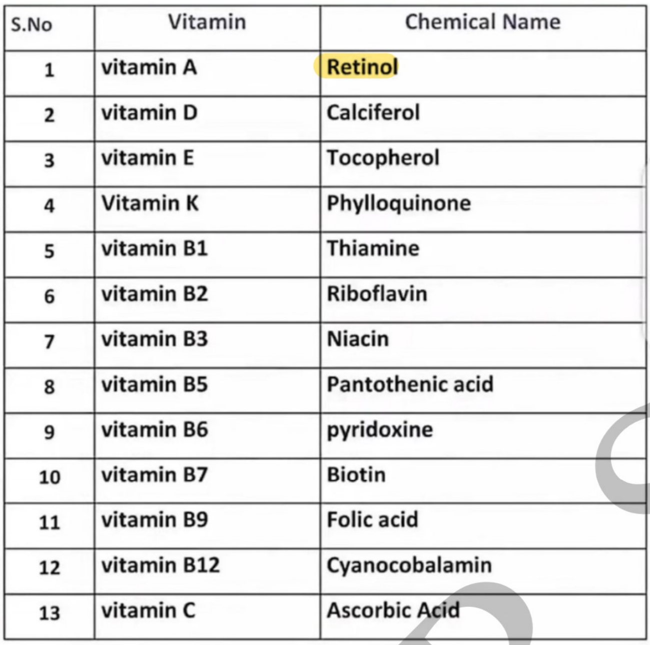
Amino Acids

Essential amino acid

our body cannot synthesises on its own

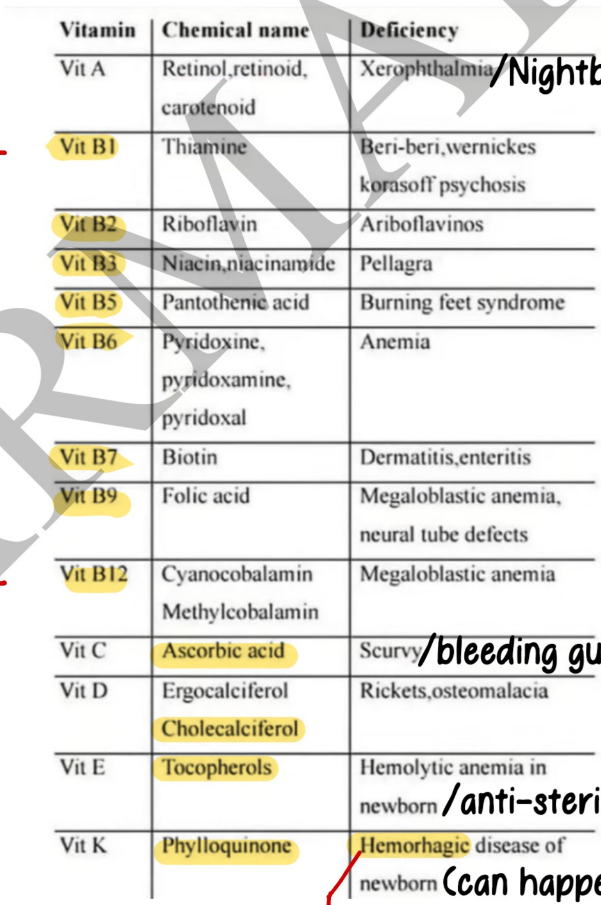
Non-essential amino acid

our body synthesises on its own



| S.No | Vitamin | Chemical Name |
|---|---|---|
| 1 | vitamin A | Retinol |
| 2 | vitamin D | Calciferol |
| 3 | vitamin E | Tocopherol |
| 4 | Vitamin K | Phylloquinone |
| 5 | vitamin B1 | Thiamine |
| 6 | vitamin B2 | Riboflavin |
| 7 | vitamin B3 | Niacin |
| 8 | vitamin B5 | Pantothenic acid |
| 9 | vitamin B6 | pyridoxine |
| 10 | vitamin B7 | Biotin |
| 11 | vitamin B9 | Folic acid |
| 12 | vitamin B12 | Cyanocobalamin |
| 13 | vitamin C | Ascorbic Acid |

Vitamin B
complexes
Total: 8



| Vitamin | Chemical name | Deficiency |
|---|---|---|
| Vit A | Retinol,retinoid,<br>carotenoid | Xerophthalmia/Nightblindness |
| Vit B1 | Thiamine | Beri-beri,wernickes korasoff psychosis |
| Vit B2 | Riboflavin | Ariboflavinos |
| Vit B3 | Niacin,niacinamide | Pellagra |
| Vit B5 | Pantothenic acid | Burning feet syndrome |
| Vit B6 | Pyridoxine,<br>pyridoxamine,<br>pyridoxal | Anemia |
| Vit B7 | Biotin | Dermatitis,enteritis |
| Vit B9 | Folic acid | Megaloblastic anemia,<br>neural tube defects |
| Vit B12 | Cyanocobalamin<br>Methylcobalamin | Megaloblastic anemia |
| Vit C | Ascorbic acid | Scurvy/bleeding gums |
| Vit D | Ergocalciferol<br>Cholecalciferol | Rickets,osteomalacia |
| Vit E | Tocopherols | Hemolytic anemia in newborn /anti-sterility |
| Vit K | Phylloquinone | Hemorhagic disease of newborn (can happen in anyone) |

No blood clotting

|  | TRICK | Diseases |
|---|---|---|
| B1: Thymine | Tho | Beri Beri |
| B2: Riboflavin | R |  |
| B3: Niacin | Ne | Pellagra |
| B5: Pantothenic acid | Pant |  |
| B6: Pyridoxin | Par |  |
| B7: Biotin | Biodata (Vitamin H) |  |
| B9: Folic Acid | Foster |  |
| B12: Cynocobalmine | Ca | Pernicious anaemia |

**Vitamin D sources**

- Sunlight
- Fish oil

**Vitamin C sources**

- Lemon
- Amla

**Vitamin E sources**

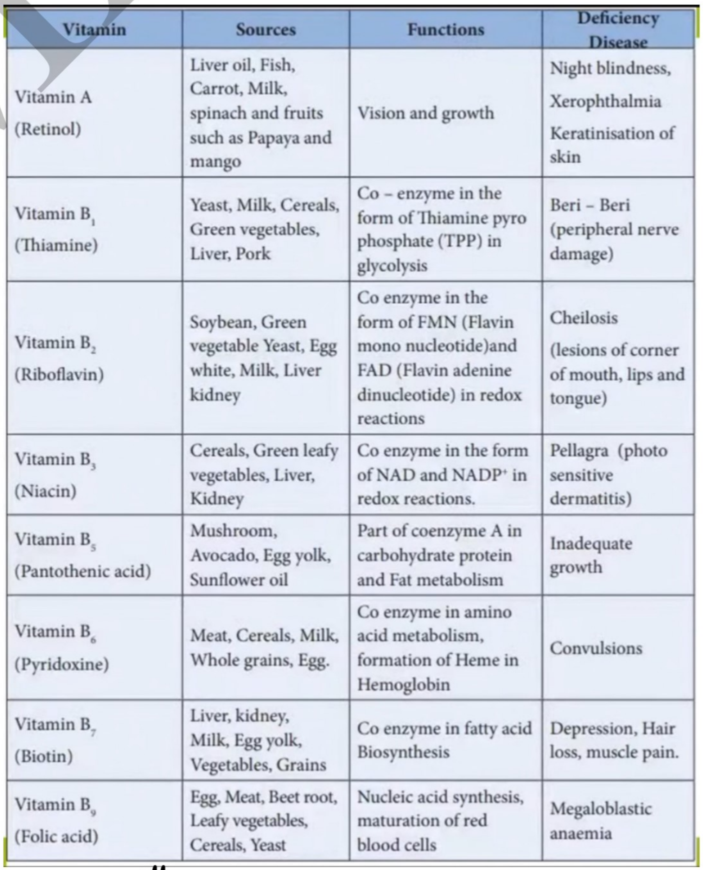
- Sprouts

- Vitamins in milk: A, B, and D

↓

Vitamin C not present

↳ Not present in eggs as well



| Vitamin | Sources | Functions | Deficiency Disease |
|---|---|---|---|
| Vitamin A (Retinol) | Liver oil, Fish, Carrot, Milk, spinach and fruits such as Papaya and mango | Vision and growth | Night blindness,<br>Xerophthalmia<br>Keratinisation of skin |
| Vitamin $B_1$ (Thiamine) | Yeast, Milk, Cereals, Green vegetables, Liver, Pork | Co – enzyme in the form of Thiamine pyro phosphate (TPP) in glycolysis | Beri – Beri (peripheral nerve damage) |
| Vitamin $B_2$ (Riboflavin) | Soybean, Green vegetable Yeast, Egg white, Milk, Liver kidney | Co enzyme in the form of FMN (Flavin mono nucleotide)and FAD (Flavin adenine dinucleotide) in redox reactions | Cheilosis (lesions of corner of mouth, lips and tongue) |
| Vitamin $B_3$ (Niacin) | Cereals, Green leafy vegetables, Liver, Kidney | Co enzyme in the form of NAD and $NADP^+$ in redox reactions. | Pellagra (photo sensitive dermatitis) |
| Vitamin $B_5$ (Pantothenic acid) | Mushroom, Avocado, Egg yolk, Sunflower oil | Part of coenzyme A in carbohydrate protein and Fat metabolism | Inadequate growth |
| Vitamin $B_6$ (Pyridoxine) | Meat, Cereals, Milk, Whole grains, Egg. | Co enzyme in amino acid metabolism, formation of Heme in Hemoglobin | Convulsions |
| Vitamin $B_7$ (Biotin) | Liver, kidney, Milk, Egg yolk, Vegetables, Grains | Co enzyme in fatty acid Biosynthesis | Depression, Hair loss, muscle pain. |
| Vitamin $B_9$ (Folic acid) | Egg, Meat, Beet root, Leafy vegetables, Cereals, Yeast | Nucleic acid synthesis, maturation of red blood cells | Megaloblastic anaemia |

- Lipophilic vitamin required for protection of cell membrane and blood cells formation: Vitamin E

- A typical adult human body contains 25g of magnesium

- Yeast breaks down the food material outside the body and then absorbs it

  ↓

  Saprophytic mode of nutrition (feed on dead or decaying matter)

- B12 is not present in plant foods ⟶ Pernicious anaemia to be target by year 2047 (India)

- Brain gets energy from glucose

- Proteins are made of 20 amino acids

- Fats store maximum energy per gram

- Soya milk: protein rich more than meat

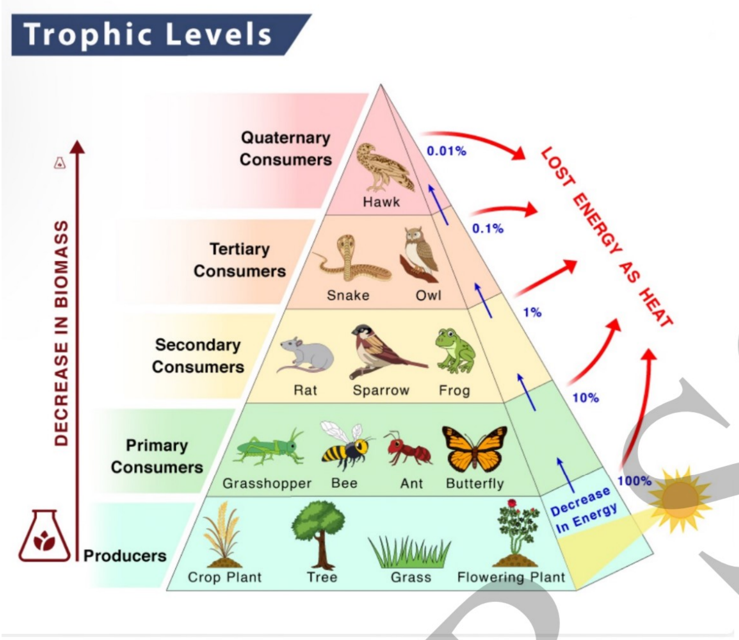
- Amla is richest in Vitamin C

- Autotrophic mode of nutrition: Carbon dioxide, water, chlorophyll and sunlight

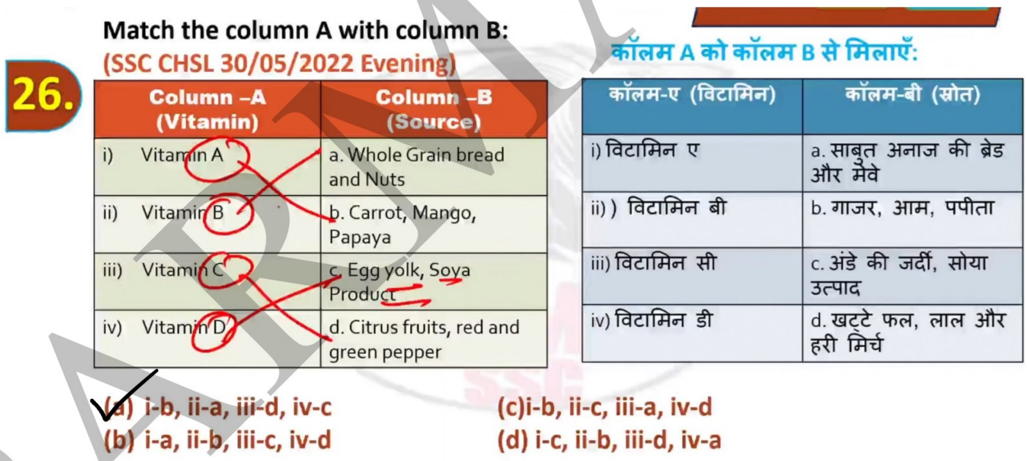
- Autotrophic mode of nutrition: bacteria

- Fungi: Heterotrophic mode of nutrition

- Amoeba: Holozoic mode of nutrition


Trophic Levels
DECREASE IN BIOMASS
Quaternary Consumers
Hawk
Tertiary Consumers
Snake
Owl
Secondary Consumers
Rat
Sparrow
Frog
Primary Consumers
Grasshopper
Bee
Ant
Butterfly
Producers
Crop Plant
Tree
Grass
Flowering Plant
0.01%
0.1%
1%
10%
100%
Decrease In Energy
LOST ENERGY AS HEAT

- Not more than 10% transfer of energy from one tropic level to another 0.1%



**26.** Match the column A with column B:
(SSC CHSL 30/05/2022 Evening)

| Column –A (Vitamin) | Column –B (Source) |
|---|---|
| i) Vitamin A | a. Whole Grain bread and Nuts |
| ii) Vitamin B | b. Carrot, Mango, Papaya |
| iii) Vitamin C | c. Egg yolk, Soya Product |
| iv) Vitamin D | d. Citrus fruits, red and green pepper |

कॉलम A को कॉलम B से मिलाएँ:

| कॉलम-ए (विटामिन) | कॉलम-बी (स्रोत) |
|---|---|
| i) विटामिन ए | a. साबुत अनाज की ब्रेड और मेवे |
| ii) ) विटामिन बी | b. गाजर, आम, पपीता |
| iii) विटामिन सी | c. अंडे की जर्दी, सोया उत्पाद |
| iv) विटामिन डी | d. खट्टे फल, लाल और हरी मिर्च |

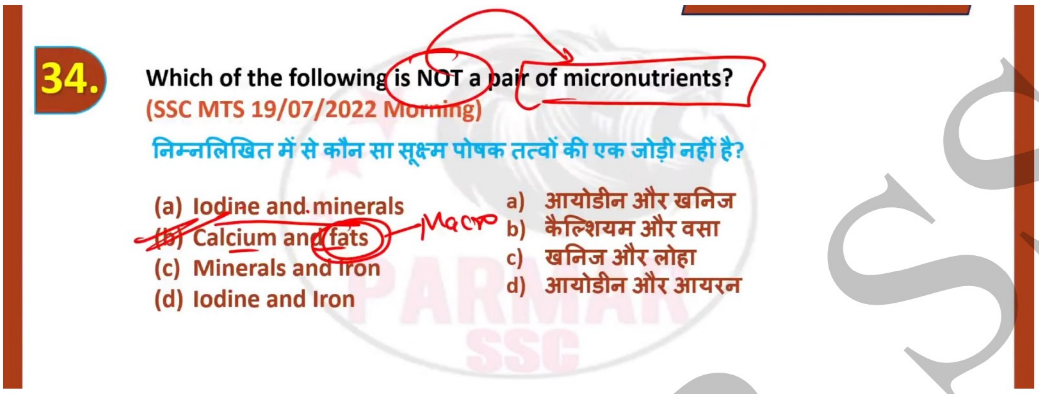
[✓ (a) i-b, ii-a, iii-d, iv-c]
(b) i-a, ii-b, iii-c, iv-d
(c) i-b, ii-c, iii-a, iv-d
(d) i-c, ii-b, iii-d, iv-a

Nutrients requirement of adolescents are higher than adult

Nuts, vegetable oil, and fish are rich in sources of Omega 3 (fatty acids)

Threonine is essential for healthy skin and teeth

- Zinc plays an important role in cell division, cell growth, would healing and the breakdown of carbohydrates



34. Which of the following is NOT a pair of micronutrients?
(SSC MTS 19/07/2022 Morning)
निम्नलिखित में से कौन सा सूक्ष्म पोषक तत्वों की एक जोड़ी नहीं है?

(a) Iodine and minerals
(b) Calcium and fats — Macro
(c) Minerals and Iron
(d) Iodine and Iron

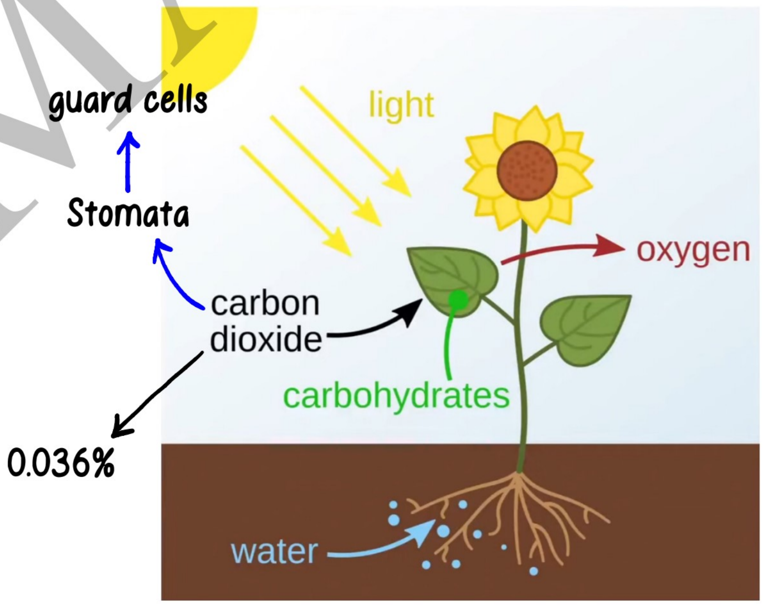
a) आयोडीन और खनिज
b) कैल्शियम और वसा
c) खनिज और लोहा
d) आयोडीन और आयरन

## NUTRIENTS IN PLANTS

- Plants make food through photosynthesis

Requires:
$CO_2$
Water
Sunlight

Sunlight ↓ Chlorophyll (green color) → Mg
Chlorophyll ↑ Chloroplast ↑ Plastids ↑ Cell of a plant


guard cells
Stomata
light
oxygen
carbon dioxide
carbohydrates
0.036%
water

- thylakoids contain a pigment called chlorophyll, that absorbs light

$$6CO_2 + 6H_2O \xrightarrow[\text{cholorophyll}]{\text{sunlight}} C_6H_{12}O_6 + 6O_2$$

$C_6H_{12}O_6$ → Glucose

$6O_2$ → oxygen is released during photosynthesis

$6CO_2$ → Dark reaction → Site: stroma

Dark reaction → Calvin cycle (light-independent reaction)/C3 cycle

$6H_2O$ → Light reaction → Site: grana

- Algae as well performs photosynthesis → Study of algae: Phycology
  - Green algae: Chlorophyta
  - Red algae: Rhodophyta
  - Yellow algae: Phycophyta
  - Fire algae: Purophyta
  - Golden brown algae: Chrysophyta
  - Brown algae: Phaeophyta

- Food stored in leucoplast; starch and oils
  - Amyloplast: starch
  - Aleuroplast: proteins
  - Elaioplast: fats and oil

- Mycology: Study of fungi

Colour

Tomato: Lycopene

Carrot: Beta carotene/Xanthophyll

Red capsicum: Beta carotene

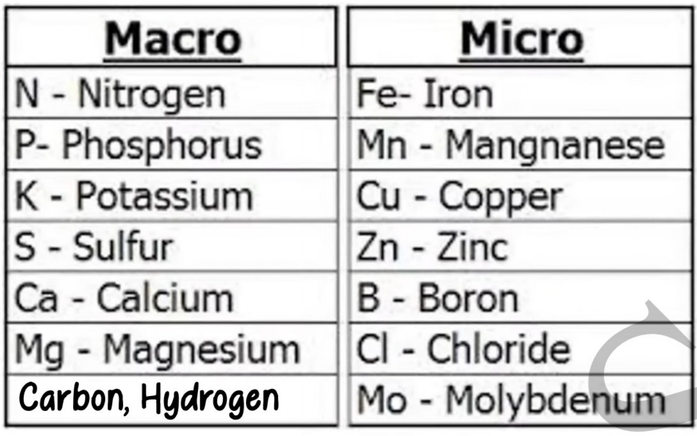
(Tomato, Carrot, Red capsicum) → Carotenoids → Traps light energy

- Cherries, apple, blueberries, grapes, pomegranate: Anthocyanin

- In brown algae food is stored in the form of complex carbohydrates that may be in the form laminarin and mannitol

NPK used in Urea

1828, Friedrich Wohler synthesised Urea



| Macro | Micro |
|---|---|
| N - Nitrogen | Fe- Iron |
| P- Phosphorus | Mn - Mangnanese |
| K - Potassium | Cu - Copper |
| S - Sulfur | Zn - Zinc |
| Ca - Calcium | B - Boron |
| Mg - Magnesium | Cl - Chloride |
| Carbon, Hydrogen | Mo - Molybdenum |

- Chlorella (algae) rich in protein and Iron
- Starches are made of long chain of glucose
- At least a half of the carbon dioxide fixation on earth is carried out by algae through photosynthesis
- Protein synthesis in plants: by use of nitrogen (legumes)

  it has rhizoid bacteria, that absorbs Nitrogen from soil or atmosphere
- Glycolysis: breakdown of glucose into pyruvate
- Release of water into air by plants: Transpiration (day)
- Guttation: secretion of droplets from the pores (hydathodes) of plants at night
- Application of plant and soil science to crop production is known as Agronomy

- Agrostology: study of grasses
- Anatomy: study of body structure/body parts
- Mango tree is example of autotroph
- ATP obtained by respiration of one molecule of glucose: 2
- Glycation: result of covalent bonding of a sugar molecule

PARMAR
SSC

# SSC GK

# PARMAR'S GK BATCH

## Biology

## Miscellaneous

### Lecture :- 10

✓ For Notes Join Telegram :

Click on the icon.

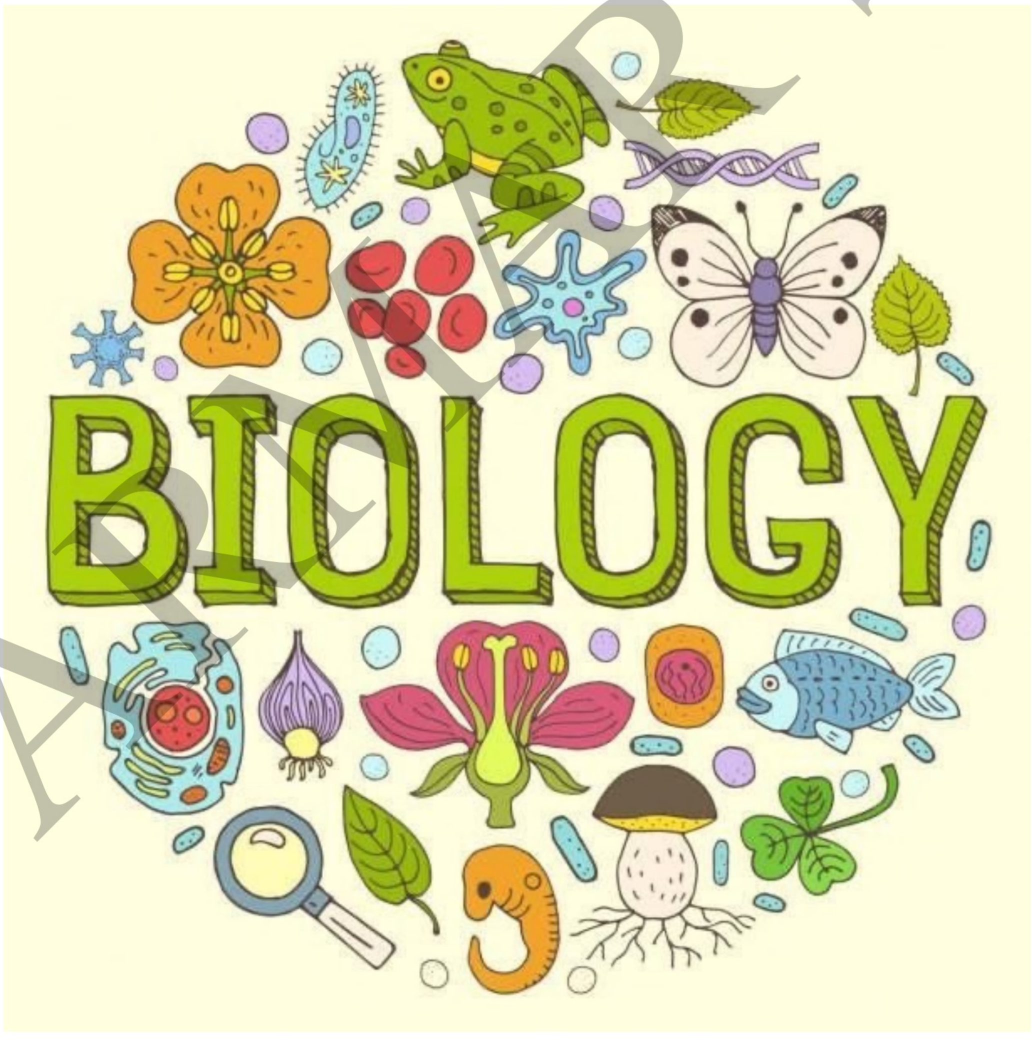
OR
Scan

✓ For Lectures Subscribe Our Parmar SSC Youtube Channel

Click on the icon.

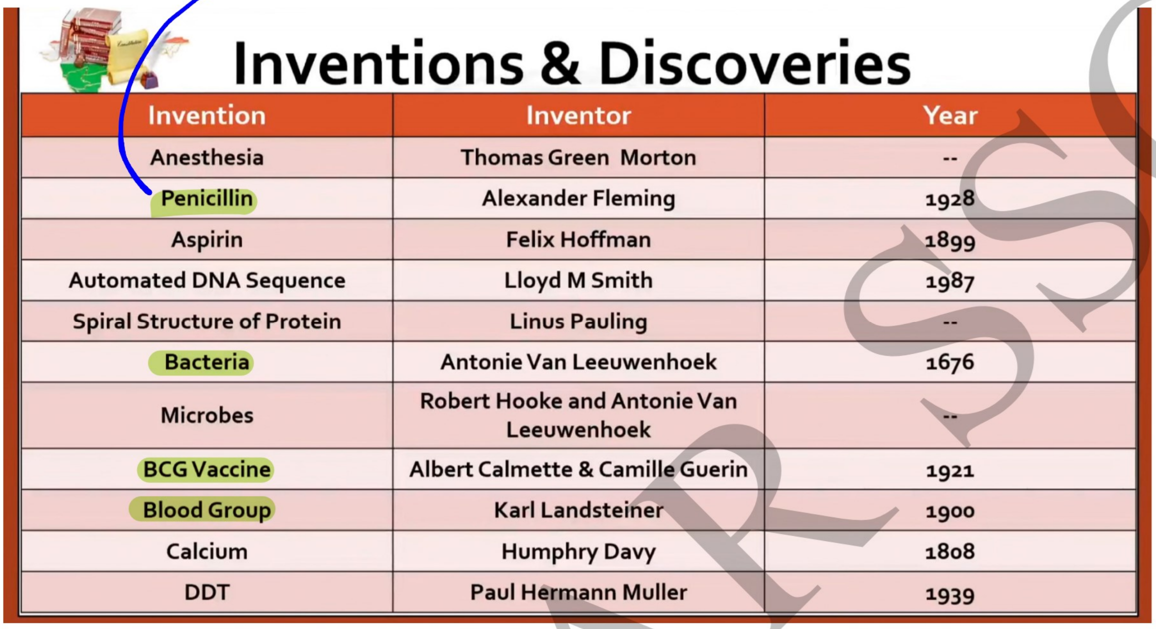
OR
Scan

# MISCELLANEOUS TOPICS



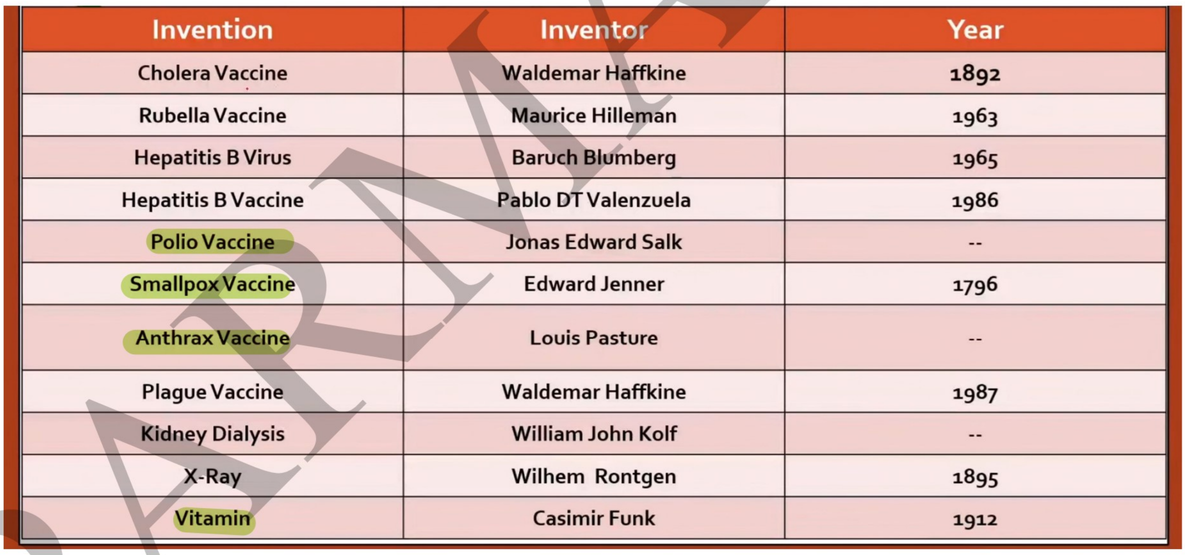
# DISCOVERIES

Antibiotics



## Inventions & Discoveries

| Invention | Inventor | Year |
|---|---|---|
| Anesthesia | Thomas Green Morton | -- |
| Penicillin | Alexander Fleming | 1928 |
| Aspirin | Felix Hoffman | 1899 |
| Automated DNA Sequence | Lloyd M Smith | 1987 |
| Spiral Structure of Protein | Linus Pauling | -- |
| Bacteria | Antonie Van Leeuwenhoek | 1676 |
| Microbes | Robert Hooke and Antonie Van Leeuwenhoek | -- |
| BCG Vaccine | Albert Calmette & Camille Guerin | 1921 |
| Blood Group | Karl Landsteiner | 1900 |
| Calcium | Humphry Davy | 1808 |
| DDT | Paul Hermann Muller | 1939 |



| Invention | Inventor | Year |
|---|---|---|
| Cholera Vaccine | Waldemar Haffkine | 1892 |
| Rubella Vaccine | Maurice Hilleman | 1963 |
| Hepatitis B Virus | Baruch Blumberg | 1965 |
| Hepatitis B Vaccine | Pablo DT Valenzuela | 1986 |
| Polio Vaccine | Jonas Edward Salk | -- |
| Smallpox Vaccine | Edward Jenner | 1796 |
| Anthrax Vaccine | Louis Pasture | -- |
| Plague Vaccine | Waldemar Haffkine | 1987 |
| Kidney Dialysis | William John Kolf | -- |
| X-Ray | Wilhem Rontgen | 1895 |
| Vitamin | Casimir Funk | 1912 |

Food web: consists of all food chain in single ecosystem, described by English ecologist Charles Elton ("Pyramid of numbers"

Ernst Haeckel: described the term ecology

Father of modern ecology: Eugene Odum

- Arthur Tansely: coined the term ecosystem
- Raymond Lindman: mentioned about the energy transfer from one tropic level to another
- Helicobacter pylori discovered by: Robin Warren (Nobel Prize in Physiology or Medicine in 2005
- Louis Pasteur: experimentally demonstrated how yeast is responsible for making alcohol from sugar
- Camillo Golgi received the Nobel Prize in 1906 along with Santiago Ramona Cajal on the structure of nervous system
- Observation of bacteria and protozoa: Antonie von Leeuwenhoek, 1974

Animalcules

Father of microbiology

- Purkinje: coined the term protoplasm in 1839
- Salamander embryos cell division: observed by Walter Fleming, in 1879
- "Every cell arises from another cell" by Rudolf Virchow in 1865
- Charles Darwin: Theory of Evolution, 1859
- Natural system of plant classification: August Eichler
- JBS Heldon: suggested life must have developed from simple inorganic molecules
- Circulation of blood by: William Harvey

- Darwin of 20th century: Ernst Mayr
- AO Hume: father of Indian Ornithology
- Salim Ali: Ornithology

  ↓

  Salim Ali Bird Sanctuary: Goa
- DNA as a molecule discovery: 1869, Fredrick Miescher
- Christian Barnard: performed world's first human heart transplant
- Crescograph discovered by: Jagdish Chandra Bose

  ↓

  To measure the growth in plants
- Father of Surgery: Sushruta
- Father of medicine: Charak
- Yoga philosophy: Patanjali
- Presence of green mould prevented the growth of bacteria: Alexander Fleming (penicillin)
- Article on the structure and origin of plant cells: 1838, by Matthias Sheldon
- Nature of structure of Chlorophyll in plants and magnesium as a central elements in its structure by: Richard Willslatter, 1915
- Lachrymal gland produces tears

  ↓

  Onions produces chemical irritants known as Syn-Propanethial-S-Oxide

Cholera vaccine by: Jaime Ferran, 1885

Leon Calmette: BCG vaccine

Smallpox vaccine: by Edward Jenner

There is no vaccine for Hepatitis C (affects Liver)

## SCIENTIFIC NAMES

- Solanum lycopersicum: Tomato
- Parthenium hyterophorus: Carrot grass
- Oleo gum resin (Asafoetida) obtained from: dried latex from the tap root of ferula
- Canis lupus familaries: Dog
- Mango: Mangifera indica
- Peacock: Pavo cristatus
- Lion tail macaque: Beard baboon
- Comb jellies: Ctenophora
- Passer domesticus: sparrow
- Canis lupus: grey wolf
- Capra aegagrus hircus: Goat
- Megaptera novaeabgliae: humpback whale
- Narcissus: Daffodila
- Rose: Rosa
- Lily: Lilium
- Malus pumila: Apple
- Banana: Musa paradisiaca Linn
- Orange: Citrus sinensis
- Bos mutus: Wild Yak

- Buffalo: Bubalus bubalis
- Ox: Bos taurus
- Horse: Equus caballus
- Gazella benneti: Chinkara
- Asian Elephant: Elephas maximus
- Housefly: Musca domestica
- Citrullus lanetus: Watermelon